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et de l'enseignement supérieur

Section des Unités de recherche

# AERES report on the research unit

Institut des Sciences Moléculaires (ISM)

From the

University Bordeaux 1

Institut Polytechnique de Bordeaux (IPB)

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University Bordeaux 1

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Le Président  
de l'AERES

Jean-François Dhainaut

Section des unités  
de recherche

Le Directeur

Pierre Glorieux

May 2010



# Research Unit

Name of the research unit : Institut des Sciences Moléculaires (ISM)

Requested label : UMR

N° in the case of renewal : UMR 5255

Name of the director : M. Philippe GARRIGUES

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Mrs Florence PARNIER, Adjointe au Délégué Régional, CNRS Délégation Aquitaine Limousin



# Report

## 1 • Introduction

- Date and execution of the visit :

The visit was planned and executed on Monday 26 of October from 11.30 till 19.00 and on 27 of October from 08.30 till 17.30 at the Bordeaux 1 campus in the facilities of the Matmecca and IECB respectively.

- History and geographical localization of the research unit, and brief presentation of its field and scientific activities:

The present institute ISM, established in 2007, is constituted by the former laboratories LACREM, LCOO, LPTC, parts of LCVS and LPCM and contains now 9 research groups and 3 shared platforms (Cesamo, Siv and modelisation) with a total of about 200 people localized on the Bordeaux 1 campus in 5 locations (bat A12 bat A 8, ENSCPB ,IUT Perigueux and IECB). In the future it is planned to group most of the research groups in A 12. The research groups have activity in fields of theoretical chemistry and modelling, spectroscopy, methodology in organic synthesis, analytical chemistry and environmental chemistry with a focus on environment, materials, nanoscience, bioactive molecules, green chemistry and catalysis and chemical reactivity.

- Management team :

The management team consists of the Director, Prof. P Garrigues, the vice director Prof. JL Pozzo, the group leaders and two TEA representatives respectively from the research and the services.

- Staff members :

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	55	41
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	37	36
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)	2	2
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	58	58
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	6	0
N6: Number of Ph.D. students (Form 2.7 of the application file)	53	31
N7: Number of staff members with a HDR or a similar grade	64	52



## 2 • Overall appreciation on the research unit

- Summary

The ISM being formed by the fusion of a number of independent laboratories is still in its infancy and still is a bit of a juxtaposition of the former entities rather than an institute with strong common goals exploiting in full the potential it holds. Some collaborative efforts between laboratories with complementary expertise start to develop suggesting that this process will be further intensified in the coming years stimulated by the spatial integration in A 12 after an absolutely essential and urgent renovation of this building. The institute is very well embedded in the national and local structure and participates actively at the European and international level. Many research groups are very good, a few excellent and the latter should be the motor for enhanced collaborations which could be further aided by more intergroup scientific activities such as an institute seminar.

- Strengths and opportunities

Several of the research groups are dynamically active in areas of multidisciplinary research which are at present at the forefront such as nanoscience, green chemistry and materials related chemistry. A collaborative tendency is emerging and is stimulated by the management by setting aside a fraction of the budget targeted for doctoral fellowships to projects proposed jointly by more than one unit.

- Weaknesses and threats

The potential of some groups is not exploited to the full. In some of the groups the group leader is a mere administrative head with little or no scientific directional power or vision. The interaction between groups as well as between sub groups in some of the larger groups could be bettered. The present unacceptable situation regarding the building A 12 has to be rapidly taken care of as this renders the ISM less attractive as a working place and hampers the recruitment of students and coworkers.

- Recommendations to the head of the research unit

The management has since the setting up of ISM done a good job to build, based on the expertise present, a research unit that starts to have some interactive added value. The probable departure of one group might entice the director to consider if there are no domains of "molecular science " missing in the portfolio of the institute. He also should consider a better balance in size between the groups by some careful reshuffling breaking at the same time the "historical" barriers between the different laboratories.

- Production results

(cf. [http://www.aeres-evaluation.fr/IMG/pdf/Criteres\\_Identification\\_Ensgts-Chercheurs.pdf](http://www.aeres-evaluation.fr/IMG/pdf/Criteres_Identification_Ensgts-Chercheurs.pdf))

A1: Number of lab members among permanent researchers with or without teaching duties who are active in research (recorded in N1 and N2)	88
A2: Number of lab members among permanent researchers with or without teaching duties who are active in research (recorded in N3, N4 and N5)	30
A3: Ratio of members who are active in research among staff members $[A1/(N1+N2)]$	0.95
A4: Number of HDR granted during the past 4 years	5
A5: Number of PhD granted during the past 4 years	30
A6: Other relevant item in the field	



REMARK : It should be noted that one group LPTC (Environmental chemistry and toxicology) did present a written report but decided not to meet the Commission in view of its decision to leave ISM. The panel then decided not to rate this group.

### 3 • Appreciation team by team and/or project by project

Title of the team: E1 Theoretical Chemistry

Name of the team leader: M. J.C. SOETENS

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	7	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	7	6
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		1
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	2	2
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	7.5	
N7: Number of staff members with a HDR or a similar grade	11	10

The members of the theory group of ISM have built up recognized expertise in a broad variety of fields within theoretical chemistry. These range from refined quantum calculations to semi-empirical and classical approaches applied to problems in molecular reactivity, molecular structure, molecular dynamics, and electronic and molecular transport phenomena, and also to methodological developments in a number of these fields. Their production in terms of peer-reviewed articles is good, but with a significant variation in productivity amongst the members of the team, and with a number of publications in high-impact journals that could be improved.

A significant number of invited presentations and active participation in the organization of international meetings is a measure of the impact of the theory team, although, again, this activity is not uniformly shared amongst its members. The theoreticians are well integrated into ISM and have ongoing collaborations with a number of experimental groups. They have also established a variety of international collaborations. Funding has been obtained at both national and international levels including two ANR contracts (one coordinated by a member of the team), three bilateral projects (with India, Cuba and Germany) and a participation in a European project. It should be noted that the theory group also provides a readily-accessible modeling service for other members of ISM. The group has attracted a quite reasonable (although worryingly decreasing) number of doctoral students, but has had only one postdoctoral researcher, which is surprising for such a large team.





The theory team is facing a number of choices which will strongly influence its future. At present, the team is active in a broad variety of areas which appear to be largely uncorrelated. This limits the manpower which can be put into both methodological development and applications in any given area and does not fully exploit the range of expertise available within the team. In addition, the coming years will see the retirement of a number of senior staff. Both these factors make it important for the team as a whole and for the team leader in particular, to set up a strategic plan for the future.

The theory team proposes a project which reflects the broad spectrum of their ongoing research. Clearly progress can be made in each of the areas they currently target, but the range of topics is considerable (gas phase reactions, electronic properties of interfaces, gas-surface reactions, the spectroscopic properties of ionic liquids, natural compounds involved in oxidative stress, the non-linear properties of molecular assemblies...) and largely reflects research already underway. The interfaces between these topics seem limited.

In conclusion, despite its well-established reputation, the theory team needs urgently to reflect on how it will evolve in the future and how it can reinforce its visibility and productivity by focusing on areas of research that are both the most promising and can enhance interactions within the team. Developing international collaborations and finding additional funding (especially for doctoral and postdoctoral researchers) would also contribute to the potential growth of the theory team.

**Title of the team:** E2 Astrochemistry

**Name of the team leader:** M. M COSTES

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	3	3
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3	3
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)	0	0
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)		
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	0	1
N7: Number of staff members with a HDR or a similar grade	4	4

The ASTRO team continues to develop experimental approaches for studying gas phase chemical reactions of interest in atmospheric and interstellar environments. This work includes the construction and development of supersonic flow experiments and, most notably, the CRESU (Reaction kinetics in uniform supersonic flow) apparatus, which has been enhanced by using upstream microwave discharge for atom production. The complexity of these experiments and the absence of technical staff within the group clearly hinder progress. The overall productivity is relatively low. This is partially offset by the efforts of the youngest members of the group, but not helped by absence of doctoral students during the evaluation period.



The work of the team led to few invited lectures at international meetings (only one of which was outside France). They have contributed to the organization of four locally-held, international meetings. Good collaborations exist with the theory group of ISM, with the astrophysics laboratory of the University of Bordeaux and with other French groups (Rennes, Franche Comté,...). An international collaboration has been established with the University of Perugia. Funding obtained includes two European contracts and two ANR projects and two Region Aquitaine projects. The visibility as measured by the citations is quite low.

The ASTRO team is in a difficult situation given their limited size, the complexity of their experiments, and the lack of both technical staff and students (one doctoral student will be recruited in late 2009). In addition, two senior members of the team will retire in the next four years. This situation requires strategic decisions to safeguard the expertise of the group and to protect the future of its younger members.

The team proposes to extend their studies of gas phase kinetics with the help of further instrumental development, notably involving a high-pressure turbulent flow reactor and the implementation of cavity ringdown spectroscopy within the CRESU experiment to determine the concentrations of reactive species. Refinement of crossed beam experiments will also be used to study low temperature reactions between neutral species. In efforts to make kinetic data in this field more accessible, the team will continue to contribute, with the astrophysics group of the University of Bordeaux, to a new database (KIDA: kinetic database for astrochemistry).

In conclusion the ASTRO team appears to be too small and too weakly supported by either technical staff or students to be able to continue in its present state. Their situation today limits both their productivity and their international visibility and they will be further challenged by the forthcoming retirement of two senior team members. A solution needs to be found, either inside or outside ISM, to ensure that the members of the team can correctly exploit their talents.

**Title of the team:** E3 Molecular spectroscopy

**Name of the team leader:** M. F. GUILLAUME

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	7	7
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	11	11
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)	1	1
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	7	7
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	0	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	19	19
N7: Number of staff members with a HDR or a similar grade	6	5



The overall quality of the research in the GSM team is rather good and some original and promising themes were developed during the last period: new photonic glasses with chiral or achiral properties studied by SHG-circular dichroism, nanostructured platform for Raman enhancement, interactions in ionic liquids, vibrational circular dichroism and Raman optical activity for determining absolute conformation of chiral molecules in solution, confocal Raman microscopy for mapping species distribution in micro fluidics devices. Nevertheless, some subjects have been investigated for quite a while but remain with a quite low impact. They should be phased out. Also, interactions do exist for a long time with other teams of the ISM but they should be amplified.

Major part of the publications appears in international journals with high standing in the field of physical chemistry and the overall number of publications is very satisfactory. Nevertheless, publications in journals with higher impact factor could be targeted. Concerning the visibility of the team, the overall number of invited talks is correct but the invitations concern mainly French meetings, showing a lower international visibility. Therefore efforts should be made to improve the international impact.

Also the number of PhD students working in the team is quite small and the number of theses defended during the period is low in comparison with the number of habilitated staff members in the team. Some habilitated staff members had no PhD student for the whole considered period. Some effort should be made to improve the staff/coworker ratio. Concerning the contractual activity, it mainly consists in public contracts while the industrial activity seems to be decreasing. This should be analyzed carefully.

Concerning the project, the number of topics presented is too large even taking into account the number of permanent full time researchers in the team. The strategy and focus need to be improved. A reflection should be organized to determine which the more promising research directions are and then the team should focus on these activities. Regular internal meetings would probably help to get a general consensus for this process and could induce a stronger and necessary collective new reflection about the project.

In conclusion, the GSM team has a solid and recognized knowledge in development of new spectroscopic methods. It is important that the means should be given to maintain through an adjusted focus a high national visibility while improving the international visibility and locally the diffusion of this knowledge towards the other teams of the ISM.

**Title of the team:** E4 Synthesis and Bioactive Molecules

**Name of the team leader:** M. E. FOUQUET

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	8	7
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	3	3
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3.5	3.5
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	19	6
N7: Number of staff members with a HDR or a similar grade	6	4



The Synthesis group has a very good number of papers published by the 3 teams in the group. Many of them are in good international chemistry journals and several of these are published in the top chemistry journals. Each of the three dynamic teams can be characterized by possessing a diverse array of research subjects, ranging from tannin chemistry, wine chemistry, organocatalysis, PET chemistry and others. Many of these topics are of prime importance either for their potential for the local region (winery), or for the potential in medicinal fields (PET chemistry, heterocyclic chemistry, natural product chemistry). This is one of the strong qualities of this research group, in that a diverse number of different research projects also allows for a stimulating environment for students to learn many areas of organic and bioorganic chemistry.

Undoubtedly each of the three teams has a high international visibility and impact within their respective fields. The team leaders have a respectable number of invitations to conferences and other institutions/private companies. Furthermore, their students seem to have been actively involved in congress participations through the number of oral and poster presentations. The teams have a good number of master students and PhD students graduating each year attesting also to their scientific attractiveness. The team leaders are well embedded locally and participate in different scientific national and international boards as well as in organizing conferences at different levels. Finally, the group as a whole has a good number of public and private contracts. All in all, the impact of this Synthesis group is high, and with active participation at different levels and areas these teams are definitely highly visible.

Within each team excellent structures for information transfer and guidance are set up and although in principle each team is independent of the other teams in respect to their research projects, there is definitely an advantage for the students, common equipment, chemical storage, seminars, common group meetings etc. that these teams are in close vicinity to each other. This is precisely one minor weakness of the group in that one of the teams is located in another building and therefore somewhat isolated from the other two teams.

In principle, the three project leaders will continue their line of research described for the last four years, but with some modifications, which are well justified. This includes the work in the area of tannins and the wine industry, which is of high interest for the region and the PET chemistry, whereby recently a cyclotron has been installed in Bordeaux. The idea of investigating multi-transition metal systems for initiating sequential transformations for heterocycle synthesis is also interesting.

The projects using an interesting combination of organocatalysis and polymer chemistry, in collaboration with other groups at LCPO and ISM, as well as new methods for tin-free radical chemistry and polyene chemistry are all ambitious and even of potential interest for industrial applications.

Finally, the proposal on the applications of hypervalent iodine reagent for natural product synthesis, as well as the chemical biology projects in polyphenol-protein interactions and new synthetic vaccines is also of high interest.

In conclusion, the group consists of three very good synthetic organic teams with high quality and ambitious research projects. The strengths are the activities within each group on the national and international scene and their dedication to educating their students by creating a stimulating working environment. Their weakness is that one of the teams is located in another building, which makes it difficult to share in full all of equipment, expertise and knowledge.



Title of the team: E5 NEO Organic nanostructures

Name of the team leader: M. J.M. VINCENT

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	5	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	4
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	4.5	4.5
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	9	10
N7: Number of staff members with a HDR or a similar grade	7	7

The group is organised around four distinct research topics (Catalysis and Organocatalysis, Recognition and sensing, self-assembled architecture and Photoactive molecules and devices). Each topic is developed by a team leader. Although the four leaders are independent, nevertheless they work on shared projects. This aspect reflects the cohesion of the group. The production of the group is very good and of high quality (24 publications per year, + 11 book chapters and books).

The members of the group are also deeply involved in teaching. The group is very well integrated within the Institute of Molecular Sciences and constitutes an important component of the structure. The team leaders are high quality researchers recognised by several national and international awards.

The quality and visibility of the group is reflected by numerous invitations to international meetings. Interestingly, these invitations are well distributed over the leaders. At the national scene, the group is also very well known. Finally, the group has attracted 5 invited foreign researchers. In terms of education and training, the group is actively involved (4 PhD per year; 2.5 post-doc per year and 6 undergraduate per year).

The group leaders are capable of obtaining financial support from the local (région Aquitaine), national (ANR) and European (ERC) agencies. A total number of 16 Contracts has been obtained over the last four years.

The group offers pertinent research projects for the future organised around the four leaders. They remain within the domains of expertise of the group (organic synthesis, coordination chemistry and catalysis, photochemistry and photophysics, supramolecular chemistry).

The horizontal organisation of the group and the resource sharing ability of leaders should be of great help to achieve the rather ambitious projects proposed. Although some of the projects are a continuation of the existing activity, others are clearly new research directions. The new projects, although risky (ion shuttles, gated ion channels, commotion) are of interest and should be tackled.



In conclusion the group is structured around four young mid-age talented and active researchers working in topics of current interests. The organisation of the group is clear and efficient allowing the autonomy of the four leaders and topics. The productivity and visibility are high and the research projects are of interest with an acceptable degree of risk. The overall appreciation of the group is very positive. There is a good balance between researchers (4A + 5B) and technical staff (5) and between students (undergraduate and PhD) and post-doctoral fellows.

This group is however working in non-acceptable conditions. The building is non functional and obsolete. If the Université de Bordeaux 1 is willing to keep these highly talented and productive researchers, it should be massively invest in their working place, commodity and facilities (microscopy). NMR, microscopy and X ray equipments are managed by the CESAMO Platform that will buy these instruments in the next two years.

In all, an excellent research group which should be further strongly supported both in terms of space (availability and quality) and characterisation facilities.

**Title of the team:** E6 Materials

**Name of the team leader:** M. T. TOUPANCE

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	4	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	6	6
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	4	4
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	11	5
N7: Number of staff members with a HDR or a similar grade	7	7

The research activity of the team is based on organic and organometallic chemistry and a long tradition of silicon and tin based chemistry to design materials showing specific properties. The core of the research activity of the team consists of the use of molecular precursors to elaborate functional materials with three main axes concerning porous materials, surface functionalization and organic-inorganic hybrid materials.

The committee has noticed the number of publications in high impact factor journals reflecting the dynamism and the potential of the team as well as a clever publication strategy, which is warmly encouraged.

The committee has the feeling that some scientific orientations taken during the four-year contract merely results from new members integration or project calls opportunities and would have gained in quality and originality if they had fully integrated existing and emerging know-hows and skills of the whole team.



An good number of PhD students, the recruitment of 3 French scientists and 4 Post-Doc( one of them coming from Australia) as well as the integration of one assistant professor coming from another team of the institute are indicative of a certain attractiveness of the team. The number of regional and national (ANR) contracts shows the ability of the team to raise funds locally. The number of patent applications/extensions is impressive, although the small number of industrial contracts raises the question of the technology transfer that leaves room for improvement in the future. This issue seems however to be properly managed in the field of catalysis and immunosensors. The international visibility of the team is limited, particularly on the basis of invited lectures and scientific networking. This situation calls for improvement.

The team organization, quality of the everyday management and communication policy seem good. The AERES committee has the impression that, stronger interactions and discussions between the three axes of the team i) would favor the emergence of relevant and more innovative projects and ii) would reinforce the unity of the team and enhance its visibility at the international level.

The project is divided into three parts corresponding to the three scientific axes of the past four-year contract and mainly consists of the continuation of the ongoing activities. The AERES committee strongly encourages the emergence of relevant projects during the next four-year contract.

In conclusion, the research activity and project of the team are based on organic and organometallic chemistry. The team is able to raise funds and its activity is visible.

The recruitment and arrival of several dynamic young researchers constitutes the major strength of the team, but diversification of the research activities if not based on solid existing and emerging know-how and skills of the whole team could weaken it.

Stronger interactions and discussions between the three axes aiming at reinforcing the international visibility of the team are necessary.

**Title of the team:** E7 Molecular Nanoscience and Catalysis

**Name of the team leader:** M. D ASTRUC

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	2	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)		
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1	1
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	7	1
N7: Number of staff members with a HDR or a similar grade	3	2



The research work performed by the nano group corresponds to a high level of skill and competence, and its originality finds its roots in the introduction of metal-containing dendrimers and nanoparticles in the field of organometallic and supramolecular chemistry. According to the very limited number of permanent positions (two research fellows and one engineer), which is a personal choice of the team leader, the production of chemistry papers, many published in journals with high impact factor, book chapters and a high number of PhD theses during the last four years period is impressive. The quality of the activity and the scientific output is of highest standard. We notice that this team is leading in the field of metallodendrimers and their application in various domains of chemistry. There are solid connections with international and local partners, and the external visibility is high as proved by the huge number of invited lectures and the number of distinctions obtained by the team leader during the last four years. For all these reasons, the committee supports this group and the continuation of his activities for the next period.

However, the rather unusual organization of this team within the frame of the French research system (few permanent positions balanced by a large number of international PhD students and post-doctoral fellows) does not favor its integration into larger units, which is strongly wanted by the governance of both the ISM institute and the University of Bordeaux. Additionally, this team has some reluctance to fit the usual requirements which allow a fair evaluation of their performance and the committee is concerned by the lack of clearly identified projects for the next period combined with a rather obscure governance concerning the future organization of the team (replacements within the permanent staff, promotions, etc.).

In conclusion, the committee strongly supports the top level scientific activity of this team, which significantly contributes to the international visibility of the Bordeaux University and of the ISM institute. The novelty and potential impact of the research performed by this team during the evaluated period is of high standard and merits to be continued. However, the committee encourages the team leader to more positively consider some compromise with his hierarchy for being involved in the common efforts of all other members of the ISM for creating an entity, in which the internal cohesion is turned to be an advantage, instead of being felt as a limitation or even a drawback. It is however important to realize that the latter recommendation is not a signal or a tool for forcing any wedding against nature, since the scientific quality of this team is recognized, supported without restriction and merits to be maintained for the next period. We can however imagine some closer links between this team and some already existing structures within the ISM, such as the NEO group, which share some common activities in coordination and supramolecular chemistry.





Title of the team: E9 Analytical Nanosystems

Name of the team leader: M. A. KUHN

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	7	6
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)		1
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)	1	
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	3	3
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	8	8
N7: Number of staff members with a HDR or a similar grade	3	3

The original research based on the development of nanostructured analytical system for medicinal or biological application and the elaboration of new electrochemical and opto-electrochemical sensors, intelligent nanoparticles, molecular probes and nanostructured surfaces and objects with potential analytical properties has led to a good number of scientific publications, many in journals with a high impact factor. In addition some patents were deposited and a good number of Ph-D theses and Master theses were defended.

The quality of the work was recognized by a national award from the analytical division of the french chemical society and group members were visiting Professors in different universities. The group received several awards either for excellent Ph-D thesis or for best poster presentations. The number of students joining the group increases indicating an increased attractiveness. Several invitations to international conferences as well as excellent funding from local, national and European public sources show that the scientific qualities coupled with the dynamism of the group can easily convince public organizations to further support their research. However, support from industrial contracts is weaker and should be reinforced.

The group leader shows very good governance, and was convincing in his presentation of the research performed in the group and has oriented the research interests more towards biological problems. A new faculty member recently joined the group and new research topics will soon emerge. The group is well embedded locally. While most of the permanent staff has administrative and teaching duties, their respective contribution to the scientific activity is however not homogeneous.

Excellent short and long term research projects with several new topics are in a preliminary phase of development and should have strong impact when successful. To have full chances of success, the integration of and support for the new more biological research line should be carefully managed.



In conclusion this is a dynamic research group with high potential. The group leader was able to structure the research group into a promising entity by leaving the field of separation techniques for projects on nanostructured analytical systems for biological and medicinal applications. This frontier field needs to combine different scientific expertise into a single working unit and a recent recruitment strengthens the group towards this direction.

The number of permanent members with a low to very low publishing profile is relatively high while a number of papers have been published in journals with high impact factor. This two aspects must be taken into account for further improving the standing of the group.

Title of the team: E10 CESAMO

Name of the team leader: M. I. PIANET

- Staff members

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)		
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)		
N3: Number of other researchers (Form 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	5.5	5.5
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)		
N7: Number of staff members with a HDR or a similar grade		

This is a technical platform which will not be evaluated as a group. The platform is well managed. There are strong interactions between the researchers of ISM and the technical staff of CESAMO. The ISM supports ca. 20% of the functioning of the CESAMO platform, the remaining 80% coming from the invoices of the analyses carried out for both academic and industrial partners. The group's projects have been (and are) strongly supported by CNRS, University of Bordeaux I and the "région Aquitaine". Furthermore, CESAMO has also gained the financial support of local industries by providing them with the structural analysis of natural products derived from wine and from woods. Considering the size of ISM, the analytical center is relatively small and cannot cover all analytical needs of the laboratory, for example, structural analysis by X-ray diffraction and nano-objects imaging by electronic microscopy. While implementing new instruments, the group must keep in mind the upgrading of their traditional MS and NMR spectrometers. The implementation of structural facilities requires the hiring of at least one qualified staff member.



## Institut des Sciences Moléculaires UMR 5255 (ISM)

Note de l'unité	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A	A+	A

Nom de l'équipe : E1 Theoretical Chemistry

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	A	A	C	B

Nom de l'équipe : E2 Astrochemistry

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
C	B	C	C	C

Nom de l'équipe : E3 Molecular Spectroscopy

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	B	A	A



Nom de l'équipe : E4 Synthesis and Bioactives Molecules

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A	A	A+

Nom de l'équipe : E5 NEO Organics nanostructures

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : E5 (E6) NEO Organics nanostructures

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
B	A	A	B	B

Nom de l'équipe : E7 Molecular Nanoscience and Catalysis

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A+	A+	C	B



Nom de l'équipe : E9 Analytical Nanosystems

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A	A	A	A	A+

Nom de l'équipe : E10 CESAMO

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
non noté	non noté	non noté	non noté	non noté

The Institute of Molecular Sciences has received the report of the AERES visiting committee and acknowledge the members for their work and comments. We appreciate to read that « Many research groups are very good, a few excellent ». However, some specific points raise questions and comments from different groups that have been discussed within the Institute.

As underlined by the audit committee, the ISM that has been created in January 2007, is still in its infancy. It is composed of 4 former laboratories and one university technical platform, having their own history, topics, practices and management rules. This fledging Institute is based on research groups and platforms with strong interactions, which support the research projects. Each group is developing its own scientific objectives with particular emphasis on collaborative actions both intra- and extra-ISM. Innovative and forefront science is carried out at the group level, recognised and visible at the international level and strongly supported by the ISM head.

Without ignoring the difficulty of the evaluation, some research groups and topics seem to attract praise or criticism more easily than others, without a clear link to classical indicators such as the number of publications and/or conferences. This is the general impression expressed by a significant number of ISM members, that is reported here.

Furthermore the report in its actual preliminary form shows a strong heterogeneity between each group report, not only in the format but also in the use of different indicators. In that regard, it is not straightforward for the Institute Head and the groups to establish a clear road-map for future directions. We hope that in the final version of the report a clearer structure with respect to the four main criteria for evaluation will be presented.

### *E1-Theoretical Chemistry*

The referees point out that the number of topics under investigation in this group is too large and limits its further development. The group members are surprised as these topics can be gathered, if needed, in three up-to-date main axes: i) creation of new methodologies (semi-classical mechanics, description of large systems of macromolecular and biological interest), ii) modeling in homogeneous and heterogeneous media (atmosphere, interstellar medium) and iii) modeling properties of materials. The group members share competences and hardware means, and have deliberately decided for a non-pyramidal management which allows each researcher to develop his particular interests. Whenever a collaboration, intra- or extra-ISM, has been deemed useful it has been undertaken with success. The well-identified problem for attracting students in the field of physical chemistry/chemical physics is obviously experienced locally, but despite this difficulty, the group has already implemented a sustained policy for welcoming foreign talented students.

### *E2-Astrochemistry Group*

Strengths and weaknesses have been clearly identified. Nevertheless, expertise and talents are exploited on highly sophisticated experiments requiring lengthy optimization before obtaining exploitable results. It is anticipated that the astrochemistry group will be able to ensure its autonomy as demonstrated in the last two years, both in the number of successfully awarded projects and a noticeable increase of significant papers. An intra-ISM solution is desired by the group members and encouraged by the ISM head that will support the scientific environment of skilled young researchers.

### *E3-Molecular Spectroscopy Group*

The remarks suggesting some weaknesses in the scientific production of the largest group of the ISM are unfounded when examining carefully the data reported in the activity report. The quantity of research topics with respect to the number of permanent researchers is actually rather small compared to other groups within the ISM. Moreover, the recent developments of new methods and techniques such as, for example, Tip Enhanced Raman Spectroscopy with a nanoscale resolution or Hyper Raman/SHG imaging have been neither highlighted nor commented. No mention was made of the SIV (Vibrational Spectroscopy Imaging) platform, a major project for the group and the Institute. In addition, the important financial support obtained through public contracts seems to have been undervalued as well as the marked increase these last few years of the number of contracts with private companies. Finally, this large group has established new fruitful collaborations with all other groups of the ISM, demonstrating its strong involvement in the science made in the Institute.

### *E6-Materials Group*

Several statements in the report appear contradictory and some comments remain too imprecise to draw a clear conclusion, which would allow an improvement of the group's activities. For instance, what are the orientations taken during the four-year contract merely results from new member integration or project calls opportunities ? The remarks concerning the relevance and the innovative aspects of the research projects for the group are not really consistent with its overall production, the number of contracts, patents and the success in the different ANR calls.

### *E7-Nanosciences Group*

The « rather unusual team organisation » of the group is not in opposition to their correct integration into the ISM. In terms of interactions, the Nano group has collaborated and published papers with three other groups of the ISM. With regard to the future projects, three projects have been clearly identified (but briefly described) in the project report of the ISM and were the main subject of the group slide presentation.

Finally, the ISM thanks the members of the visiting committee for their input through this first audit report of our young Institute. Such an outside view is a useful tool to evaluate the situation, to exploit the existing skills and to initiate more ambitious scientific projects. We expect that our research/academic institutions (Université Bordeaux 1, IPB, CNRS) will continue to support our Institute.

Le Directeur de l'ISM  
Docteur Philippe GARRIGUES



Le Président de l'Université Bordeaux 1  
Professeur Alain BOUDOU

