



INNER

Ideas Laboratory

On

**Physics and chemistry of surfaces
and interfaces for breakthroughs
in energy efficiency**

March 14 to 19, 2009

La Villa Clythia - CNRS

Fréjus – France



Ideas Lab - Context

The context of “Ideas Labs” is *energy efficiency*. Energy efficiency is our starting point, but it is traditionally an incremental approach to solving energy problems, and it often deals with improving the efficiency of existing technology. In the Ideas Lab, we are looking for breakthrough solutions: innovative ways of producing, transferring and storing energy, perhaps even innovative sources of energy. *A breakthrough in energy efficiency is the challenge of this event.*

Ideas Lab - Objectives

The INNER ERA-Net, supported in the European Commission under the Sixth Framework Programme, is searching for ways to bridge the gap between advances in basic science and new energy research. Mining scientific information is known to be a difficult task so an attempt will be made to identify new ideas and approaches in the first “Ideas Lab” organised as a joint action in the INNER-ERA-Net project.

This open call asks for extended abstracts on interesting research being carried out by chemists, physicists, biologists, mathematicians and engineers. The abstracts will be evaluated by experts and successful researchers will be invited to attend the “Ideas Lab”. Here they will not only present their own research and its relevance to energy but will have to compete against other ideas. Groups of researchers will then work together on the most innovative and interesting approaches and, in a final round, will once more compete with the other groups to identify the most promising research applicable to energy.

This first **Ideas Lab** will seek interesting research being carried out at universities and national laboratories on the “**physics and chemistry of interfaces which could provide breakthroughs in energy efficiency**”. The focus is on innovative ways of producing, transferring and storing of energy.

All aspects of physical, chemical and biological phenomena occurring at the interface (solid/liquid/gas) are addressed. Some examples of possible topics are listed below, but these are not exclusive.

Ideas Lab – Possible Topics

- Capillarity
- Nature and thermodynamics of interfaces

- Surface films and liquid substrates
 - Humidity and oxygen barrier films
 - Aging of organic molecules (films) and synthesis of more robust molecules
 - Electrical aspects of surface chemistry
 - Mechanisms of electric conduction in organic films and intensification of charge mobility
 - Control of the position of energy levels in organic molecules
 - Long range forces
 - Interfacial transport and nanomaterials- Topology and mechanics of solid surfaces
 - Mechanics and deformation of soiled surfaces
 - Friction, lubrication and adhesion
 - Microscopy and spectroscopy of solid surfaces
 - Functional interfaces for thermal isolation: high Kapitza resistance nano-composites
 - Formation of new phase at the interface (nucleation and crystal growth)
 - Solid-liquid interface and contact angle
 - Wetting, flotation and detergency
 - Nano-hydrodynamics: giant electro-kinetic effects for energy conversion
 - Absorption from solution at solid-liquid interface
 - Emulsions, foams and aerosols
 - Macromolecular surface films, charged films, and Langmuir-Boldgett layers
 - Gas and vapour adsorption on solid surfaces
 - Chemisorption and catalysis
 - Catalytic reactions (Fischer Tropsch, combustion, biomass degradation..)
 - Atomization and sprays
 - Adsorption of CO₂ by solvents and membranes
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- Reactions in porous media (chemical reaction in geological layers, CO₂ storage in geological layers.)
- Enzymatic electrocatalysis of hydrogen oxidation
- Electrode supports for stability, protection, activity and strong surface concentration of enzymes
- Design and production of enzymes for the transformation of vegetal walls in biological production of hydrogen
- New materials for lighting

Ideas Lab - Project assessment

Topics for the IdeasLab cover a wide area in the basic disciplines. It is up to the participants to support their contribution to the event by providing written evidence of the following criteria, which will be used by the jury to assess the applications:

- originality and creativity of the idea
- its well established scientific basis and its consistency with the basic laws of the corresponding discipline
- skill, care and thoroughness in carrying out the study
- reasoning and clarity in the interpretation of the results
- relevance of the subject and the idea to energy and the contribution of the idea to one or several energy supply means

Ideas Lab - Who can take part?

All very active, communicative scientists and technologists can apply to participate in the Ideas Lab. Candidate selection will be made based on the personality of the applicant as well as the scientific quality of his or her contribution. Successful candidates must fulfil both conditions. The final choice will be made by the Director of the Ideas Laboratory.

Parallel to proposal submission potential candidates should submit a two page curriculum vitae.

Candidate selection will be made based on the following criteria:

- Personality (communicative, willing to collaborate, challenge seeking, risk taking..)
- Scientific quality of his/her contribution
- Gender and experience balance

There are no age or degree restrictions but candidates with a Ph.D. degree and a few years of research experience are encouraged to participate.

The number of selected participants for the final event is limited to 15 persons.

To apply please refer to the application form: [PDF-file](#)

Ideas Lab - The prizes

Aside from the intellectual enrichment of taking part in the creative, facilitated Ideas Lab sessions, participants in the Ideas Lab compete for a number of prizes.

The CNRS-ADEME Prize (€5000) will be awarded to a participant (or team of participants) who produces the best idea for promising research relevant to breakthroughs in energy efficiency. This will be based on previous work and the ideas developed during the Ideas Lab. In addition, two “front runner” awards of €1000 will be presented to successful contestants.

All Ideas Lab participants will be eligible to submit proposals – based on their work during the Ideas Lab – to the CNRS Exploratory Projects programme. Proposals can be submitted up to December 2009. Projects must include at least one participant in the Ideas Lab, and at least two participants from different laboratories in different countries. Winning proposals will be supported by the CNRS energy programme with a grant of up to €15000 for continuing the work. The winner will be announced by the end of May 2010.

Ideas Lab - Jury

The Jury is composed of 6 members of international reputation. They will carry out their duties as individuals and not as representatives of an institution or country. Members of the Jury are selected on the basis of scientific criteria; they are drawn from both academia and industry. They are appointed by the INNER committee, based on the proposal of the Ideas Lab Director, who will ensure an appropriate geographical balance when constituting the Jury.

Ideas Lab - Where?

Ideas Laboratory will be held in La Villa Clythia of CNRS at Frejus located in Provence, France.

Frejus is easy to access:

- By railways: TGV to Saint Raphaël (3 km – 2 miles) and bus or shuttle service to Fréjus/Valescure.
- By roads: Michelin road maps n° 84 and n° 245. A8 leave Fréjus, head for Cannes (N7 and N98).
- By plane: Nice (70 km – 45 miles), Toulon (90 km – 55 miles), Marseille (140 km – 85 miles)



Fréjus

Ideas Lab – Costs

Participation to the Ideas Lab is free of charge. Travel expenses of the participants will be the responsibility of the INNER representative of their home country where reimbursement will follow national laws and regulations. Other expenses will be paid for by CNRS (Centre National de la Recherche Scientifique – France).

Ideas Lab - How to apply?

Interested individuals are requested to submit a four page abstract of their contribution, a CV and the application form by mail simultaneously to:

H. Peerhossaini – Ideas Lab Director (hassan.peerhossaini@univ-nantes.fr) and R. Lopez – secretariat (carnot@univ-perp.fr).

Ideas Lab - Programme

- March 14, arrival of the participants in the afternoon and social dinner
- March 15, social programme day and introduction to the Ideas Lab
- March 16, the confrontation of ideas
- March 17, the synthesis of ideas
- March 18, prototyping solutions and awarding the CNRS-ADEME prize
- March 19, departure of the participants in the morning

Ideas Lab - Deadlines

Dates for submission of abstracts, CV and application form, notification of acceptance, and invitation will depend on the national process decided by the responsible INNER partner.

Should your country not be involved in INNER, please contact the Ideas Lab Director directly.