



The Abdus Salam  
International Centre for Theoretical Physics



## Joint ICTP/IAEA Advanced Workshop on Development of Radiation Resistant Materials

20 – 24 April 2009

(Miramare – Trieste, Italy)

The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy, in cooperation with the International Atomic Energy Agency (the IAEA), Vienna, Austria, is organizing the Advanced Workshop on Development of Radiation Resistant Materials, to be held at ICTP, Trieste, from 20 to 24 April 2009.

Within the frame of the INPRO and Generation IV initiatives, the next generations of nuclear power reactors are under assessments and in the R&D process. Almost all new reactor concepts are specified by higher efficiency and better utilization of nuclear fuel with minimization of nuclear waste. For the sustainability of the nuclear option, there is currently a renewed interest worldwide in new reactors and closed fuel cycle research and technology development; however, such an approach means that a new class of structural materials with significantly better radiation resistance will have to be introduced. To achieve the high performance parameters, more focused research and testing of new candidate materials are necessary.

Recent development of new classes of materials with improved microstructural features, such as composite materials (SiC) and Oxide Dispersed Strengthen (ODS) or advanced Ferritic-Martensitic (FM) steels, is quite promising since they have very good radiation resistance properties. In view of the successful and timely implementation of design parameters, new structural materials - in particular for primary circuits - have to be developed in the next decade. The on-going research has proved that recent progress in material science, supported by computer modeling, can accelerate the R&D process for development of new structural materials.

The scope of the Workshop is education, training and information exchange. Participants will be familiarized with the physics, materials and engineering aspects of structural materials for selected reactor designs. A comprehensive review of fission, as well as fusion reactor designs of the innovative material concepts presently under consideration, will be given.

### **PROGRAMME:**

The programme will consist of lectures, tutorials and computer demonstrations. Participants will also be invited to make short (10-15 minute) presentations covering their own research activities. The participants will study and discuss the theoretical foundation of all aspects related to the material problems including key issues, as radiation effects on microstructure and properties, advanced post-irradiation methodologies and multi-scale modeling as well as qualification of new structural materials. In addition, the attendees will gain knowledge related to structural materials of selected reactor designs as well as most critical areas from a structural materials point of view. The students will be familiarized with the modern theoretical approaches for the development of quantitative models of radiation-induced material degradation. They will learn the principles of the qualification methodologies and become acquainted with the current status of R&D and new challenges in radiation material science. Based on the discussion of the impact of the present uncertainties on the performance of structural materials for innovative reactor systems, the need for theoretical & experimental testing and validation procedures will be justified.

### **PARTICIPATION:**

Scientists and engineers from all countries who are members of the United Nations, UNESCO or IAEA may attend. They should hold a university degree or postgraduate degree/diploma in physics, engineering or related subjects. The School will be conducted in English and participants must therefore have adequate language knowledge. Although the main purpose of the Centre is to help researchers from developing countries, graduate students and post-doctoral scientists from developed countries would equally benefit from the School and are encouraged to apply.

As a rule, travel and daily subsistence expenses of participants are borne by their home institutions; limited funds are, however, available for those participants, who are nationals of, and working in a developing country, and who are not more than 45 years old – this support is available only to those attending the entire activity. Every effort should be made by candidates to secure support for their travel fare (or at least part of the fare).

There is no registration fee to be paid.

### **HOW TO APPLY FOR PARTICIPATION:**

The application form can be accessed at the activity website: <http://agenda.ictp.it/smr.php?2026>  
Once in the website, comprehensive instructions will guide you step-by-step, on how to fill out and submit the application form **before 20 January 2009**.

### **SECRETARIAT:**

Elizabeth Brancaccio (Ms)

Telephone: +39-040-2240284

E-mail: [smr2026@ictp.it](mailto:smr2026@ictp.it)

Telefax: +39-040-224163

<http://www.ictp.it/>

Jointly with the  
International Atomic Energy Agency

### **DIRECTORS:**

**V. INOZEMTSEV**

and

**A. ZEMAN**

(IAEA, Vienna, Austria)

### **LOCAL ORGANIZER:**

**S. SCANDOLO**

(ICTP, Trieste, Italy)

### **KEY TOPICS:**

**Radiation damage phenomenon**

**Microstructures and mechanical  
properties of nuclear power  
structural materials**

**Key material parameters and  
operational conditions of selected  
reactors designs**

**Multi-scale approach in modeling  
of material properties under  
irradiation**

**Advanced microstructural  
probing methods**

**Qualification of new structural  
materials**

**Pathways to development of new  
structural materials**

**On-going challenges in radiation  
materials science**

**DEADLINE**  
**20 January 2009**