



**Period: Summer Term 2024**

**Time: Thursday, July 4, at 12.00**

**Venue: RUB, ZGH seminar room 03-121**

**Prof. Noel O'Dowd**

School of Engineering University of Limerick, Ireland

will give the seminar

## **Deformation behaviour of P91 martensitic steel: Multiscale testing and crystal plasticity modelling**

Host: Prof A. Hartmaier, ICAMS, RUB

### Abstract:

In this presentation, Noel will discuss the use of multiscale tests and models to investigate the deformation behaviour of a martensitic (body centre cubic) steel P91, used in power plant piping. At the microscale electron back scattered diffraction (EBSD) is used to track the orientation changes in the material, while digital image correlation is used to monitor strain at the meso-scale. A novel shear test specimen has been developed to allow large deformations ( $> 40\%$  strain) to be monitored in-situ in a scanning electron microscope (SEM) in conjunction with EBDS measurement. Micro-pillar compression using a nano-indenter is also used to examine deformation of a single crystal (grain) of the material and to determine the relevant slip systems to be used in a crystal plasticity finite element model. The ability of the crystal plasticity model to predict the deformation in the shear test and micropillar compression test is assessed.

### Bio:

Noel O'Dowd has been Professor of Mechanical Engineering at the University of Limerick since 2006. Prior to this, he was Reader at the Department of Mechanical Engineering, Imperial College London. From 2010 to 2016 he was director of the Materials and Surface Science Research Institute (now part of the Bernal Institute) at the University of Limerick. Noel's research interests are in the mechanical behaviour of materials, including fracture mechanics, computational mechanics and constitutive modelling. He

published over 150 articles on these topics with web of science h-index of 33. His research on constraint based fracture mechanics and residual stress have been incorporated into the British Standard's Guide to methods for assessing the acceptability of flaws in metallic structures (BS 7910).

The *Materials Science and Technology Seminar* is jointly organized by the *IM* (Institute for Materials) and *ICAMS* (Interdisciplinary Centre for Advanced Materials Simulation). Members of the *RUB Materials Research Department MRD* and of the *DGM Regionalforum Rhein-Ruhr* are cordially invited to participate in the seminar. For further information please contact: Dr. Manuel Piacenza, [icams@rub.de](mailto:icams@rub.de), phone: +49 234 32 25480.

