**EUROMECH Colloquium 570**
**"Multi-scale analysis of the impact of microstructure on plasticity and fracture in interface-dominated materials"**
*20 – 23 October, 2015, Houffalize, Belgium*

*Chairperson: Prof. Laurent Duchêne*
*Co-Chairperson: Prof. Aude Simar*

EUROMECH Colloquium 570 was held far from cities, at a location that encouraged participantion in the meeting room. The presentations and activities were indeed well-supported throughout. There were 60 participants, most of whom participated in the entire 3 days of the Colloquium. More than half were young PhD students. 36 presentations where given orally, including 6 keynote lectures, and 10 posters. Invited speakers increased the quality of Colloquium 570. The conference hotel environment favoured further discussion during lunch and dinner, which sometimes continued late into the night. Other discussions were initiated during a visit to the Ashouffe brewery, which favoured new friendships within the community.

Two communities that do not talk together often enough were represented in the presentations: experimentalists and modelling specialists. They were invited to exchange views on the common theme of mechanics of interfaces. The divide between the two communities could be seen clearly during the question/answer sessions, but both communities took advantage of these exchanges and various collaborations have been initiated.

**Colloquium themes**

**Elementary plasticity mechanisms** Frédéric Mompiou of the Centre d'Elaboration de Matériaux et d'Etudes Structurales of Toulouse (France) discussed his original method for observation of plasticity by in-situ TEM. William Curtin of the Ecole Polytechnique Fédérale de Lausanne (Switzerland) discussed his molecular dynamics model results. He explained both the limitations of the method and the extra value that can be derived from experimental data.
**Crystal plasticity** Christian Niordson of the Technical University Denmark presented his results on strain gradient plasticity and also discussed the advantages and limitations of the method.
**Interface fracture** Dominique Leguillon of the Université Pierre et Marie Curie of Paris (France) presented a theoretical study of the interaction of cracks with interfaces. This emeritus professor allowed the young researchers to take advantage of his extensive experience in the field. That was also true during the discussion around posters.
**Plastic localization, ductility and interface fracture** Cem Tasan of the Max-Planck Institut (Germany) discussed the new method he has developed to analyse in-situ the fracture of metallic materials. This experimental method is impressive and it initiated a strong debate about the scales at which the mechanisms should be observed.
**New systems (primarily metallic)** Harry Bhadeshia discussed the theme of percolation in steels. Senior researchers as well as junior researchers were unanimous in saying that the presentation was very interesting and didactical. All were glad to get the chance to hear this renowned scientist talk and discuss their poster on the final day.

The presentations were followed by an animated debate that was usually initiated by the more senior researchers but with younger scientists playing an active role in the developing discussion. The invited speakers participated actively in the debates and gave useful comments to the young researchers during the poster presentation session.

**Poster presentations**

The 10 poster presentations were a great success. All presenters gave two minute summaries of their poster presentations, before a more personalised discussion in front of the posters. The young researchers

were well-satisfied with the discussions around their posters, which remained on display for the 3 days of the colloquium.

**Closing session**

Further animated discussion took place during the closing session. The young researchers took an active part in that discussion. It highlighted the contributions of Colloquium 570 and revealed interest in developing new experimental methods and an increase in 3D tomography imaging to investigate interface questions in material science. It also highlighted the interest in advanced numerical methods for investigation of the problem of transfer of plasticity at the interfaces.