



INTERDISCIPLINARY CENTRE FOR
ADVANCED MATERIALS SIMULATION

ICAMS Seminar

Prof. Dr.-Ing. Heinz-Werner Höppel

Lehrstuhl WWI: Allgemeine Werkstoffwissenschaften,
Universität Erlangen-Nürnberg, Germany

Monday, June 25, 4:30 p.m. **NEW ICAMS building Universitätstr. 90a, Room 0.08**

Tailoring Materials Properties by Accumulative Roll Bonding

Nanocrystalline (NC) materials are known to exhibit extraordinary mechanical properties and hence turned into focus of research during the last decade. One major drawback of the successful use of NC-materials in engineering applications is the limited quantity of NC materials or the restrictions in geometry. In this context, Severe Plastic Deformation (SPD)-processes are of particular interest, as they allow producing of bulk nanostructured materials in technological relevant quantities and geometries. Very promising processes are Equal Angular Pressing (ECAP) and the Accumulative Roll Bonding (ARB). In particular the latter process turns into focus, as it allows producing ultrafine-grained (UFG) sheet materials with a high potential for light weight constructions. Moreover, this process can be easily adapted to standard production lines. Besides the well-known standard route of ARB-processing, the ARB-process also offers a high flexibility to produce innovative sheet materials with a tailored design. By an adopted ARB-processing, particle-, fiber- and foil-reinforced materials can be generated. Furthermore multi-component laminated materials can be produced by repeated cladding of different alloys. By these wide varieties of processing alternatives the properties of the sheet materials can be designed and/or locally varied. These laminated or sandwich-like structures allow combining desired properties of the materials involved. Post-ARB heat treatment offers another possibility for tailoring materials properties of graded structures as shown for example by formation of $TiAl_3$ in Al/Ti laminates.

In the talk the high flexibility of the ARB-process for producing tailored or graded materials' properties and for generating new light-weight materials is shown. In order to understand this new class of materials better, some interesting aspects of dominating deformation mechanisms are also addressed.

For more information contact STKS secretary: Hildegard.Wawrzik@rub.de

ICAMS/ Universitätstr. 90a/ 44789 Bochum