



ICAMS Seminar

Dr.-Ing. Michael Marx

Universität des Saarlandes

Werkstoffwissenschaft und Methodik

Saarbrücken, Germany

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Interaction of short fatigue cracks with different grain boundaries:

FIB tomography and calculations

From the emission of dislocations till short crack propagation fatigue is a local process determined by the microstructure. If micro-cracks propagating in stage I interact with grain boundaries this results in a retardation of the crack growth rate. To quantify the resistance of a grain boundary against crack propagation, new experiments were performed. With a focused ion beam (FIB) artificial stage I micro-cracks were initiated with reproducible crack parameters like crack length and distance to the obstacle. By this technique the interaction of cracks with different grain boundaries could be investigated by keeping the crack parameters constant. After the fatigue tests, FIB tomography shows the three dimensional geometry of cracks passing a grain boundary. Thereby the inclination angle of the grain boundary was identified as a very important parameter. Finally the complex fluctuating crack propagation rate could be calculated analytically based on standard models like the BCS-model and the Tanaka-model.

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

ICAMS/ Uni-Hochhaus-West/ Stiepeler Str. 129/ 44801 Bochum