

京都大学 構造材料元素戦略研究拠点

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中国・清華大学の Andy Godfrey 教授をお迎えして、下記のセミナーを行います。是非多数ご参集ください。

July 5 (Fri), 2013 (2013年7月5日(金)) 10:30-12:00

京都大学吉田キャンパス 工学部物理系校舎 3F 316 セミナー室

Effect of microstructural length scale on deformation microstructure formation during compression of aluminium samples prepared by spark plasma sintering.

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Abstract: The talk will present results on the effect of grain size in the near-micrometre grain size regime on deformation microstructure formation in samples of aluminium prepared using a spark plasma sintering (SPS) technique. By careful control of the SPS process samples have been prepared with a fully recrystallized grain structure with average grain sizes ranging from approx $5\mu\text{m}$ to $0.8\mu\text{m}$. Detailed electron microscope investigations have been made on samples deformed by compression to reductions of 20% and 30%. Grain subdivision by formation of dislocation rotation boundaries is seen for grain sizes down to 500nm. A number of transitions in the appearance of the deformation microstructure are seen, however, with decreasing grain size, from well defined cell-blocks in grains of size down to approximately $5\mu\text{m}$, to dislocation cell structures in grains of size less than $1\mu\text{m}$, suggesting that cell block formation becomes progressively more difficult with decreasing grain size. The observations are analyzed with respect to differences in the flow curves of the samples, as determined from both compression test as well as from tensile tests on miniaturized samples, where a transition in mechanical properties with decreasing grain size is also seen. If time permits some results also on the effect of sample length scale will be presented, based on SEM and TEM in-situ deformation of Ag-nanocubes prepared by a chemical synthesis route. These samples avoid many of the problems associated with pillar samples prepared using either focused ion-beam milling.

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