

Strengthening Induced by Grain Boundary Solute Segregations in Ultrafine-Grained and Nanocrystalline Alloys: a Brief Review

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Abstract. The experimental data, computer simulations and analytical models describing strengthening mechanisms acting in nanocrystalline and ultrafine-grained alloys containing grain boundary solute segregations are briefly reviewed. We demonstrate the important role of grain boundary solute segregation in strength enhancement of ultrafine-grained alloys. We show that these segregations allow reaching yield strength exceeding one predicted by Hall-Petch dependence. Available experimental and theoretical data indicate that strengthening induced by grain boundary solute segregations is achieved by either suppressing dislocation emission from GBs or hampering dislocation slip through grain interiors.

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