

Strengthening and Softening of Nanoceramics: A Brief Review

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Abstract. We briefly review the experimental data, the results of computer simulations and analytical models that describe the mechanisms of room-temperature plastic deformation of nanocrystalline ceramics (NCCs) and the effects of these mechanisms on hardness of NCCs. We demonstrate the importance of grain boundary (GB) mediated processes, such as GB sliding, grain rotation and GB amorphization in NCCs. We show that these processes can be responsible for contradictive data on hardness of nanocrystalline MgAl₂O₄ spinel with small grain sizes, which demonstrate either direct or inverse Hall-Petch dependence for hardness.

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