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Twinning in nanocrystalline fcc and bcc metals VLADIMIR S. BOYKO, ROMAN YA. KEZERASHVILI, Physics Department, New York City College of Technology, The City University of New York — The deformation twinning in nanocrystalline (nc) face-centered cubic (fcc) metals, body-centered cubic (bcc) metals, and in nc Si is analyzed. The phenomenological approach is used to make a bridge between microscopical mechanisms of twin nucleation and macroscopical characteristics of twinning with different crystal structures and to calculate the grain size range of the twinning propensity, the requisite external stress for twinning propagation in nc polycrystals, and the grain size at which the slip begins to prevail over the twinning. The developed approach allows to derive analytical expressions and estimate lower and and upper limits of grain sizes at which a twinning propensity is occurred. Results of calculations for the nc fcc metals Al, Cu, Ni, Pd, Au, nc bcc metals Ta, Fe, Mo, W, Nb, and nc diamond-cubic Si are compared with the experimental data, otherwise predictions are made.

Roman Kezerashvili
Physics Department, New York City College of Technology,
The City University of New York

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