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Mechanisms of Deformation Twinning Near Crack Tips in Nanostructured Materials

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Abstract. A brief review of the theoretical models which describe specific mechanisms of deformation twinning near crack tips in nanocrystalline and ultrafine-grained materials is presented. In the first model, formation of deformation twins occurs through emission of twinning dislocations from grain boundaries driven by the external stress concentrated by the pre-existent crack. Within the second model, deformation twins are formed due to ideal nanoshear events initiated by high local stresses in the vicinities of crack tips in nanocrystalline materials. These special mechanisms of deformation twinning near crack tips serve as effective toughening micromechanisms in nanostructured materials.

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