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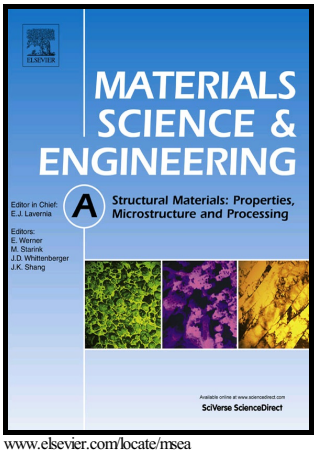

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An overview of modeling the stacking faults in lightweight and high-entropy alloys: theory and application

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Modeling stacking faults in lightweight and medium- to high-entropy alloys is an exciting and fast developing field. Stacking faults and associated defects play a key role in understanding and modeling mechanical properties of alloys. We review the recent the studies of stacking faults, dislocations and twins in the novel alloys. Although this Review is focused on the theories and their applications in modeling stacking faults, relevant experimental progresses are also discussed. The Review starts with a brief introduction for the significance of stacking faults. The theoretical methods to calculate (generalized) stacking faults are then summarized and new developments of the methods are formulated. In the framework of thermodynamics, we discuss the factors that affect stacking fault energies with latest examples. Important applications of the (generalized) stacking fault method in lightweight and high-entropy alloys are demonstrated in details with research by us and other researchers. Last but not least, some generalizations of the generalized stacking fault method are discussed, among which is our new method to search possible twin boundaries. We conclude that many of these methods developed for the conventional alloys are ready for future applications in the medium- and high-entropy alloys as well.