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Study on the Local Stress Induced Dislocations on $(\bar{1}\bar{1}\bar{1})$ Te Face of CdTe-based Crystals

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Abstract: The rosette-like dislocation clusters around Te inclusions in as-grown CdZnTe/CdTe crystals and those introduced by the micro-indentation on CdZnTe/CdTe surface are studied experimentally. The extended dislocation patterns are formed around Te inclusions in both CdZnTe and CdTe crystals, owing to the build-in stress. Two mutually orthogonal tetrahedrons are observed in CdZnTe crystal. However, the "double-arms" dislocation rosette pattern extended along <110> direction is observed in CdTe crystal. The Peierls kink pair mechanism and the Hirsch effects are used to explain the discrepancy of these two different rosette patterns. Similar dislocation rosette patterns are observed on indentation surface of CdZnTe crystal. The dislocation rosette patterns are found to be independent of the indenter orientation, but completely determined by the crystallographic properties of zinc-blende structure of the crystal. Furthermore, the Te(g) and Cd(g) dislocation arms are found to be mixed and bended with each other in CdTe crystal under high indentation stress, making it different from that generated around Te inclusions. A