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Quantitative Correlation of Local Stress Field and Surface Morphology in Undulated Si1-xGex/Si(100) Thin Films[1] CHI-CHIN WU[2], ROBERT HULL, University of Virginia — We have performed in-situ transmission electron microscope measurements of misfit dislocation propagation velocities to quantitatively characterize the stress field variations for undulated epitaxial Si1-xGex/Si(100) thin films. For a strained Si0.7Ge0.3 film with a 30 nm mean thickness and annealed at ∼480°C, the dislocation velocity varies from 50 to 200 nm/s as the threading arm of a propagating dislocation line traverses a period of the surface morphology. Using detailed correlations we have previously developed between misfit dislocation velocities and local driving stresses, we can translate this velocity range into an effective stress on the dislocation that varies from ∼ 0.3 to 1.2 GPa. These results show great promise for correlating local stresses with morphology in these materials.

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