Interactions between dislocations and overgrown v-shaped defects in GaN epitaxial layers — Phillip Weidlich[1], Michael Schnedler[1], Holger Eisele[2], Rafal E. Dunin-Borkowski[1], and •Philipp Ebert[1] — [1]Peter Grünberg Institut, Forschungszentrum Jülich GmbH, 52425 Jülich, Germany — [2]Institut für Festkörperphysik, Technische Universität Berlin, 10623 Berlin, Germany

Due to the lack of large bulk substrates, most group III-nitride epitaxial layers have to be deposited on lattice-and thermal-mismatched substrates. The mismatch induces high dislocation concentrations. A variety of methods were invented to reduce the dislocation concentration in epitaxial GaN. Their common principle is the introduction of interfaces or inclined growth facets, which influence the line directions of threading dislocations. Inclined growth facets are also introduced by one of the most common extended defect in GaN layers, so called v-shaped defects. Therefore, we investigate the interactions between dislocations and v-shaped defects by mapping the spatial distribution and projected line directions of dislocations intersecting a cross-sectional (10-10) cleavage plane of GaN epitaxial layers using STM. The data is correlated with the spatial positions of v-shaped defects. The dislocations are found to be bent away from the inclined semipolar facets of v-shaped defects, due to a strain-induced repulsive interaction. The dislocation distribution is characterized by agglomerations and intersecting bundles of dislocations with parallel projected line directions, stabilized by many-body effects in the repulsive strain interactions.