Formation of kink bands in olivine : a microstructural investigation

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Résumé pour : poster

Kink band formation is a strain-accommodation mechanism sometimes observed in olivine, particularly under conditions where the available slip systems do not satisfy the von Mises criterion. Previous studies on Mg_2GeO_4 olivine (Burnley *et al.* 2013) have demonstrated that kinking is closely associated with dominant [001] slip, producing sharp orientation gradients and localized lattice rotations that can be resolved by EBSD at the grain scale. However, the organization of the dislocation structures responsible for kink band nucleation and growth remains insufficiently constrained.

In this contribution, we present a renewed investigation of kink banding in both germanate and silicate olivine, combining EBSD with transmission electron microscopy, with a particular emphasis on orientation mapping by ACOM-TEM. This approach allows direct characterization of lattice rotations, subgrain boundary development, and dislocation arrangements at spatial resolutions inaccessible to EBSD alone.

Our observations show that kink bands are formed through the progressive interaction and accumulation of [001] dislocations, leading to the development of narrow zones of intense lattice rotation bounded by geometrically necessary dislocations. ACOM-TEM orientation maps reveal that kink band boundaries correspond to organized dislocation structures accommodating progressively sharper misorientations.