PLASTICITY OF AN ATOMICALLY LAYERED CRYSTAL: A COMBINED NANOMECHANICAL AND AB INITIO STUDY ON MO_2BC

Sandra Korte-Kerzel, RWTH Aachen University
korte-kerzel@imm.rwth-aachen.de
Stefanie Sandlöbes, RWTH Aachen University
Tobias Klöffel, FAU Erlangen-Nürnberg
Bern Meyer, FAU Erlangen-Nürnberg

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Plasticity in atomically layered crystals, such as X_2BC or MAX phases, is not yet fully understood. Particularly plasticity on non-basal planes is rarely considered. The reason for this lies both in the prevalence of basal deformation observed (MAX) or predicted (X_2BC) and the difficulties in performing single crystal experiments on anisotropic and brittle materials challenging to produce in bulk form. We therefore employed a combined approach using microcompression, TEM including conventional and LACBED dislocation analysis and ab initio calculations to elucidate the active deformation mechanisms in Mo_2BC. We show that appreciable ductility in Mo_2BC is indeed achieved due to the activation of previously unexpected non-basal slip.

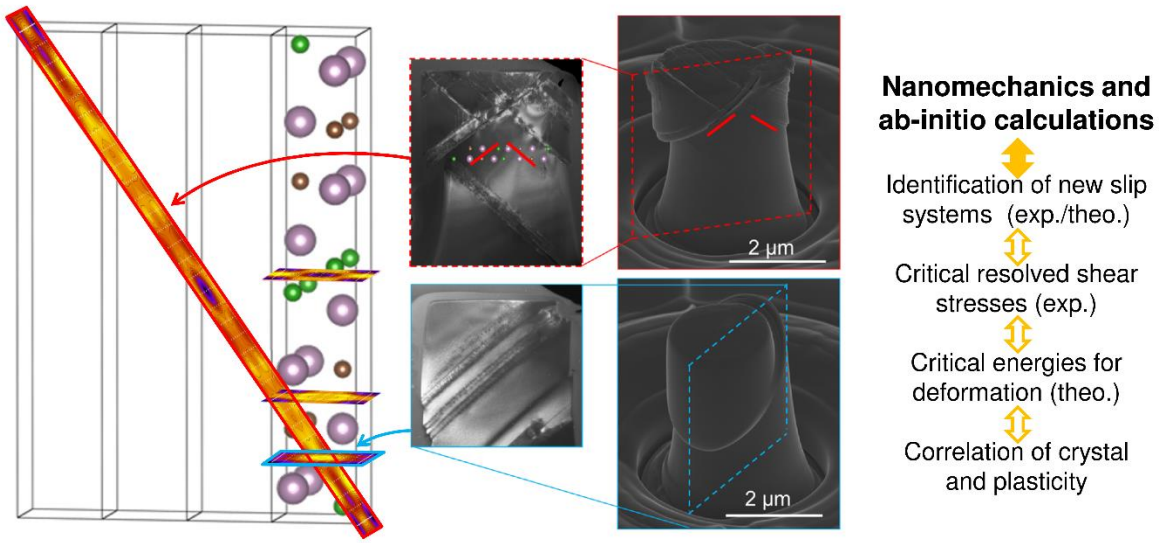

Figure 1 – Combination of ab-initio calculations and microcompression with SEM/EBSD and TEM