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マイクロメカニックス理論に基づいて多結晶試料から単結晶弾性率を決定する際の結晶粒形状の影響

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Impact of grain shape on the micromechanics-based extraction of single-crystalline elastic constants from polycrystalline samples with crystallographic texture

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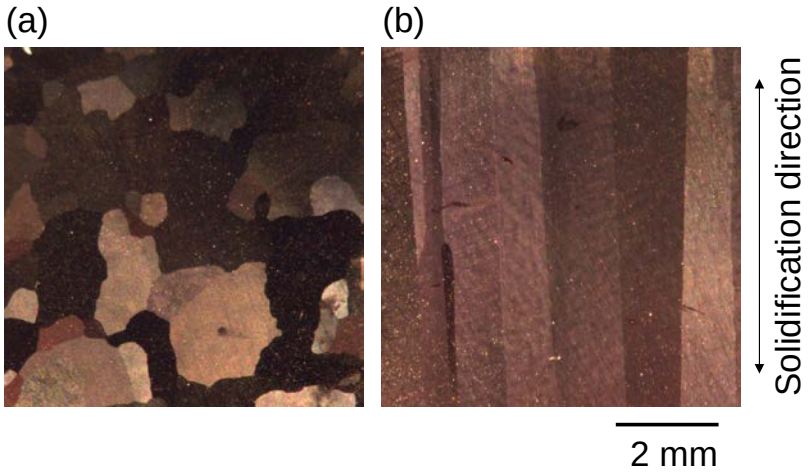
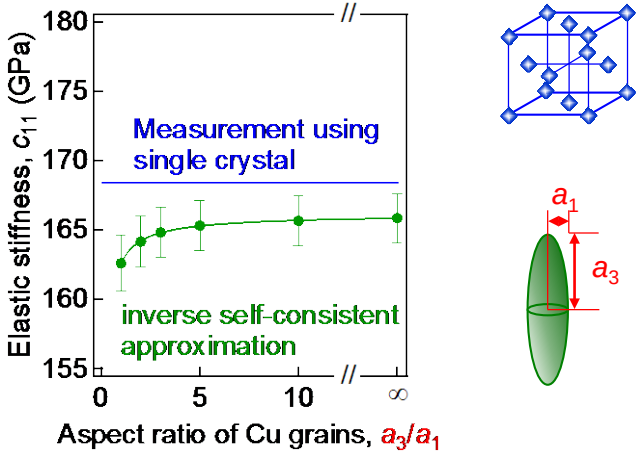


Figure1. Optical microscope images of the microstructures in a directionally solidified Cu polycrystal, observed in cross sections (a) perpendicular and (b) parallel to the solidification direction. Reprinted from (DOI:10.1016/j.actamat.2016.09.04) with permission from Elsevier.



An elastic-stiffness component c_{11} of single-crystalline Cu determined by inverse self-consistent approximation. The elastic-stiffness component directly measured using a single-crystalline Cu specimen is shown for comparison. Reprinted from (DOI:10.1016/j.actamat.2016.09.04) with permission from Elsevier.

結晶配向性を有する多結晶試料から単結晶弾性率を決定することが可能なinverse self-consistent近似を新たに構築した。構築した手法を用いて、単結晶弾性率を決定する際に結晶粒形状を考慮することの重要性を明らかにした。

A micromechanics-based method (inverse self-consistent approximation) that can extract all the independent elastic constants of single crystals from those of polycrystals with crystallographic texture was newly developed.