Grain boundary wetting correlated to the grain boundary properties: A laboratory-based multimodal X-ray tomography investigation

The penetration behavior of liquid gallium in aluminum is characterized using laboratory X-ray attenuation tomography and related to grain boundary properties obtained from the 3D grain map reconstructed by laboratory diffraction contrast tomography (LabDCT). The data is unique because more than 100 grain boundaries are analyzed. It is suggested that it is the grain boundary energy which determines if a boundary is wetted or not: low energy boundaries are much more resistant to liquid gallium than higher energy ones. The potentials of using laboratory diffraction contrast tomography for statistical studies of grain boundaries are thereby demonstrated.

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