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Rapid assessment of anisotropic surface dissolution processes using atomic force microscopy (AFM) and electron backscattered diffraction (EBSD): A corrosion study of polycrystalline alloy 22 in various acidic environments JEREMY GRAY, BASSEM EL-DASHER, JOEL HAYES, CHRISTINE ORME, Lawrence Livermore National Laboratory — We utilize atomic force microscopy (AFM) and electron backscattered diffraction (EBSD) to correlate crystallographic orientations with dissolution rates of polycrystalline alloy 22 surfaces exposed to hydrochloric, sulfuric and oxalic acids. Additionally, we utilize AFM to gain insight into the dissolution mechanism processes and to correlate the dissolution current with penetration depth. For all acids, the dissolution rates scale with the deviation of the angle with the surface normal from the (1 1 1) direction. In hydrochloric and oxalic acids, the alloy dissolution is approximately uniform across individual grains. In contrast, in sulfuric acid, the dissolution is inhibited at crystallographic step sites.

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