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The dynamic ductile fracture of high purity copper SARAH WARD, CHRISTOPHER BRAITHWAITE, ANDREW JARDINE, Univ of Cambridge — Ductile fracture is widely accepted to proceed through the nucleation, growth and coalescence of voids to form a failure plane. Ductile fracture voids form at grain boundaries, and it has been shown that impurities and secondary phase particles are often found at the centre of these voids. In pure metals, without impurities, theories suggest that void nucleation and growth is governed by dislocations and their substructures, which in turn are underpinned by the plasticity behavior, which is often highly strain rate and history dependent. Here, we describe research which aims to understand the effects of material microstructure and plasticity behavior upon the dynamic fracture properties of high purity copper, by means of high-rate loading of ring samples. Rings of OFHC copper in both the 'as-received' and annealed conditions are investigated, at strain rates between 10^3 and 10^4 s^{-1}. The fragments are studied using Scanning Electron Microscopy, where the characteristic nature of the fracture surface is used to understand the failure mechanism. The effect of the initial microstructure of the material on the fragmentation can then be elucidated through comparisons with the fracture surfaces.

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