

Trimodal hierarchical nanoporous copper with tunable porosity prepared by dealloying Mg-Cu alloys of close-to-eutectic compositions

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Abstract

Hierarchical porous metals are widely considered for practical use due to their attractive mechanical, thermophysical and transport properties. With the clear technological trend towards miniaturization, hierarchical nanoporous metals (HNMs) are particularly attractive. Control of porosity, stability as well as the development of new simple synthesis methods remain among the main challenges for HNMs. In this work, we explore dealloying of near-eutectic compositions of binary alloys as an efficient one-step method for development of HNMs with the easily controlled porosity-stability relation. Application of this approach for Mg-Cu alloys resulted in a bulk self-supporting samples of nanoporous copper possessing a rare and desirable trimodal pore size distribution or improved stability. Proposed root can be used for development of other HNMs with controlled porosity and stability for a wide range of applications.

Graphical abstract

