Nanoporous copper from binary Cu-Ca amorphous precursor by simple dealloying in water.

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Production of nanoporous materials by simple or electrochemical dealloying is being used for several decades. This is one of the most common methods, which allows driving the structure formation by the power of the chemical solution, and by the control of time and temperature. However, very often, such methodology requires the usage of highly aggressive chemical media. In this work, we suggest the fabrication of nanoporous copper (NPC) via dealloying annealed amorphous Cu-Ca precursor in distilled water, by removing a Ca-rich phase.
The as-cast and as-dealloyed material are characterized by means of several techniques, including scanning (SEM) and transmission (TEM) electron microscopy, orientation imaging by TEM and 3D imaging by focused ion beam. Further image treatment and analyses of pore geometry, crystallite sizes, and orientation mapping are performed. Measurements gave a system average pore size of about 16,5 nm and about 19,2 nm for ligaments.
In spite of its only drawback, the high fragility, the obtained material presents high surface area, which makes it promising for application fields such as catalysts and surface-enhanced Raman spectroscopy substrates (SERS).

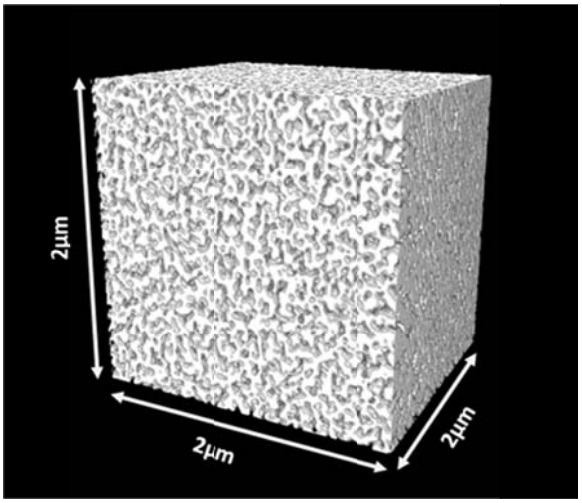

Fig. 1. 3D electron tomography reconstruction of nanoporous copper.