Synthesis of Au sponges based on agarose template

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Metal-containing porous frameworks have been comprehensively utilized in various applications including electrochemical, catalysis, bio-filtration, and heat dissipation. To synthesize those materials, the thermal reduction of metal ion within porous structures have been used. In this study, self-supporting framework of Au sponges with macro-pores, which could be prepared by heating a metal ion impregnated in agarose paste. The agarose gel, which is extracted from red algae, is a biopolymer based on C that comprises a 3D interconnected pore structure. It is abundant in nature and biodegradable, while showing a higher mechanical strength than that of other natural polymers. Importantly, it enables one to control the shape and porosity with high scalability, which indicates that the use of agarose as a sacrificial template is highly advantageous for the synthesis of Au sponges. Herein, a series of data obtained from X-ray photoelectron spectroscopy and X-ray diffraction indicates that the Au sponges were well synthesized with high crystallinity. The structural properties of porous Au were methodically investigated using Rietveld refinement and density-functional-theory calculations.