Porous Polymer for Precious Metal Capture

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Precious metals indicate the coinage group of silver and gold and the platinum group of ruthenium, rhodium, palladium, iridium, and platinum. These metals are highly valuable and used in diverse industries due to their superior properties. Since precious metals are limited resources, the mining of these metals should be broadened from natural ores to secondary sources such as electronic waste (e-waste). The current technologies for precious metal recovery from the secondary sources, also called 'Urban mining', include pyrometallurgy, hydrometallurgy, and biometallurgy, but not yet feasible because of the lengthy process, health risks and environmental impact. In this study, porous porphyrin polymer, COP180, was synthesized. The polymer selectively captured precious metals among 63 elements. Through a reductive capture mechanism, gold is particularly recovered with ten times the theoretical limit, reaching to a record 1,617 g/g. With 99% uptake taking place in the first 30 minutes, the porous polymer can be rapidly desorbed and reused for repetitive batches.