

Nanoscale uranium-based cage clusters inspired by uranium mineralogy

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Abstract: Taking advantage of the bent uranyl-peroxide-uranyl interaction found in studtite, 26 nanoscale clusters have been synthesized using uranyl hexagonal bipyramids. Sixteen of these clusters are built from uranyl hexagonal bipyramids only. Eight contain pyrophosphate groups that bridge between uranyl polyhedra, and two contain oxalate groups that adopt a similar structural role. These clusters contain from 20 to 60 uranyl polyhedra and have diameters in the range ~1.5 to 3 nm. All spontaneously selfassemble in aqueous solution under ambient conditions. Properties and potential applications of these materials will be examined.

