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[231] Interfacial Actinide Coordination Chemistry: Bis(porphyrinato)thorium Formation, Rotation, and Characterization

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Actinide-based metal-organic complexes and coordination architectures encompass intriguing properties and functionalities, but are still largely unexplored on surfaces. We report the first in situ synthesis of actinide tetrapyrrole complexes under ultra-high vacuum conditions, both on Ag(111) and *h*-BN/Cu(111) supports. Exposing a tetraphenylporphyrin (TPP) multilayer to an elemental beam of thorium followed by a temperature-programmed reaction and desorption of surplus molecules yields bis(porphyrinato)thorium (ThTPP₂) assemblies. The resulting complexes were characterized by x-ray photoelectron spectroscopy, scanning tunneling microscopy and spectroscopy, temperature-programmed desorption, and complementary density functional theory modeling. Our results give insight into the supramolecular assemblies of ThTPP₂ and highlight the conformational and electronic properties of these double-decker compounds with submolecular precision.

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