Scientific Achievement

A mechanically linked octacationic molecule, DAPPHC$^{8+}$, was synthesized at an impressive 30% yield under ambient conditions and analyzed via experiment and computation to confirm its identity, structure, and electronic properties.

Significance and Impact

It was shown that ultrafast intramolecular energy and electron-transfer processes occur within DAPPHC$^{8+}$: it will be possible to take advantage of this energetically favorable self-templated dimerization in future research to construct more complicated mechanically interlocked molecular structures with high charge densities.

Research Details

The synthesis of an octacationic homo[2]catenane, DAPPHC$^{8+}$, was obtained as a result of templation involving homophilic interactions between two DAPP2+ units in a bisbromomethylbenzyl precursor.

- Strong π–π interactions help to balance the energy penalty arising from Coulombic repulsions in DAPPHC$^{8+}$. 

Three-dimensional structure of the synthesized catenane, DAPPHC$^{8+}$, displaying the mechanically interlocked nature and the geometry of the molecule.