

# The atomic path for constructing single-helical superstructure of AuCu nanoclusters

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## Abstract

Single-helical or double-helical structures are common in all living organisms, such as RNA and DNA. Helical assembly has been found in the artificial nanoparticles, but how they do so remains poorly understood. Here, we exploit atomically precise Au<sub>6</sub>Cu<sub>6</sub> alloy nanoparticles (or called nanoclusters) as building blocks to construct a single-helical Au<sub>12</sub>Cu<sub>12</sub> superstructure in an operative path, thereby providing access to currently elusive mechanistic pathways. We propose that the thermodynamically viable linear-to-bent process at a couple of Au<sub>6</sub>Cu<sub>6</sub> nanoclusters imparted by the organic ligands seems to be critical for the helical-nanostructured arrangement of Au<sub>12</sub>Cu<sub>12</sub>. This study could help to offer new design rules for the exquisitely helical structure assembled from nanoparticles.

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