

Mo₆S_{9-x}I_x recognitive connectors forming molecular electronics networks.

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We report on the recognitive self-assembly of molecular-scale circuits using sulfur-terminated sub-nanometer diameter Mo₆S_{9-x}I_x (MoSI_x) molecular nanowires. We demonstrate solution-processed attachment of MoSI_x nanowire leads to gold nanoparticles (GNPs) in different configurations. We further demonstrate multi-terminal branched circuits with GNPs (such as shown in the Figure), opening a self-assembly route to multiscale complex molecular-scale architectures and networks at the single-molecule level.

We also show that naked nanowires have the potential to bind thiolated proteins such as green fluorescent protein or thyroglobulin directly, thus providing a universal construct to which almost any protein or organic molecule which contains thiols could be attached.

The MoSI_x nanowires have been shown to have good electrical conductivity on the nanometer scale. Experiments on electron transport suggest that correlations between electrons may need to be considered when constructing molecular scale circuits with MoSI_x nanowire connectors.

