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Water-Floating Giant Nanosheets from Helical Peptide Pentamers.[1] JAEHUN LEE, KI TAE NAM, Seoul Natl Univ — One of the important challenges in the development of protein-mimetic materials is to understand the sequence specific assembly behavior and the dynamic folding change. Conventional strategies to construct two dimensional nanostructures from the peptides have been limited to beta-sheet forming sequences in use of basic building blocks because of their natural tendency to form sheet like aggregations. Here we identified a new peptide sequence, YFCFY that can form dimers by the disulfide bridge, fold into helix and assemble into macroscopic flat sheet at the air/water interface. Because of large driving force for two dimensional assembly and high elastic modulus of the resulting sheet, the peptide assembly induces the flattening of initially round water droplet. Additionally, we found that stabilization of helix by the dimerization is a key determinant for maintaining macroscopic flatness over a few tens centimeter even with a uniform thickness below 10 nm. Furthermore, the capability to transfer 2D film from water droplet to other substrates allows for the multiple stacking of 2D peptide nanostructure, suggesting possible applications in the biomimetic catalysts, biosensor and 2D related electronic devices.

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