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Chemically-controlled Assembly of Functional Protein Architectures[1]

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Proteins represent the most versatile building blocks available to living organisms or the laboratory scientist for constructing functional materials and molecular devices. Underlying this versatility is an immense structural and chemical heterogeneity that renders the programmable self-assembly of proteins an extremely challenging design task. To circumvent the challenge of designing extensive non-covalent interfaces for controlling protein self-assembly, we have endeavored to use chemical bonding strategies based on fundamental principles of inorganic and supramolecular chemistry. These strategies have resulted in discrete or infinite, 1-, 2- and 3D protein architectures that display high structural order over large length scales (yet are dynamic/adaptive and stimuli-responsive) and possess new emergent chemical/physical properties.

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