Peptides adopt secondary, tertiary and quaternary conformations in solution that assemble into hierarchical nano-scale architectures. Their nanostructure, gelation kinetics and elastic modulus depend on the peptide's primary sequence and can thus be conveniently tuned by changing the primary sequence. Functionality may be engineered at specific sites due to ease and versatility of the solid phase synthesis process. Simple solution self-assembly construction methods can be employed for the synthesis of peptide based nanostuctures.

SOL GEL CHEMISTRY SCHEME
Tetraethyl orthosilicate (TEOS) is used to coat the peptide fibrils with a thin layer of silica that proceeds via the following two steps.

Hydrolysis of TEOS:

$$\text{Si(OC}_2\text{H}_5\text{)}_4 + \text{H}_2\text{O} \rightarrow \text{Si(OH)}_4 + \text{C}_2\text{H}_5\text{OH}$$

Polycondensation via formation of siloxane bonds:

$$\text{Si(OH)}_4 + \text{Si(OH)}_3\text{O}^- \rightarrow (\text{OH})_2\text{Si-O-Si(OH)}_3^- + \text{OH}^-$$

$$\text{Si(OH)}_3\text{O}^- + \text{Disilicic acid} \rightarrow \text{Trisilicic acid} + \text{OH}^-$$

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