Materials and Methods

Solid phase peptide synthesis: Fmoc protected amino acids and Wang based resins were purchased from GL Biochem. All other chemicals were purchased from Sigma-Aldrich. Deprotection and coupling of amino acids was carried out manually in a rotating glass reactor vessel at 0.4 mmol scale. For each peptide, the Fmoc-Valine Wang resin was allowed to swell for 15 minutes in dried dimethylformamide (DMF). The amino acid was then deprotected for 20 minutes using a solution of 20% piperidine in DMF. Coupling was carried out using Hydroxybenzotriazole (HoBT), O-Benzotriazole-N,N,N',N'-tetramethyl-uronium-hexafluoro-phosphate (HTBU) and N,N-Diisopropylethylamine (DIPEA) in DMF. A Kaiser test was used to monitor the process. Stepwise deprotection and coupling of amino acids was repeated until the desired peptide was synthesised. The Fmoc peptides were cleaved from dried resin using a trifluororoacetic acid (TFA) solution containing 2.5% distilled water and 2.5% triethylsilane (TES). The peptide solution was precipitated in glacial ether, and dried under vacuum.

Gel Formation: Approximately 20mg of the peptide was solubilised by the addition of a minimal volume of 1M sodium hydroxide (NaOH). The pH of the peptide solution was then slowly reduced by the dropwise addition of 0.2M hydrochloric acid (HCl) under mixing until a self-supporting gel was formed. Once a gel was formed, distilled water or 0.1M Phosphate buffered saline was added to make the sample up to the final volume. Titration curves were obtained by ionizing ~10mg of peptide in 50uL of 1M NaOH and 200uL of distilled water. 10uL of 0.2M HCl was added sequentially and the pH measured after every addition. The pH of the gels was measured using a microprobe pH meter.

Negative stain transmission electron microscopy: Transmission electron microscopy (TEM) was performed on a HITACHI HA7100 TEM with tungsten filament at 100kV. Copper grids were coated with formvar and left to dry overnight before being glow discharged. Negative staining was performed to image the SAP samples. 20 µl of gel was placed on the grid for 30 seconds after which any excess was blotted off using filter paper. The grid was then washed with water, and blotted. The grid was then briefly placed in a drop of 0.75% uranyl formate, blotted, and placed in a second drop of uranyl formate for 20 seconds. The grid was allowed to dry overnight before imaging in the TEM.

Fourier Transform Infrared Spectroscopy. FTIR analysis was performed on a Bruker Alpha FTIR spectrophotometer running in ATR mode with a spectral resolution of 2 cm^{-1}. Samples of preformed hydrogel were pressed against the ZnSe crystal. The spectra were obtained by averaging 32 interferograms for each sample.

Circular Dichroism Spectroscopy CD spectra were measured with a Chirascan CD spectrometer (Applied Photophysics) with a QUANTUM Northwest temperature control unit at a 0.1 mm pathlength rectangular cell, with 1s integration, step resolution of 1 mm, response of 0.5s, bandwidth of 1 nm and slit width of 1 mm. Samples were added to the cell using a pipette.

Rheological Analysis Mechanical properties of the formed SAPs were assessed using a Physica MCR 501, Anton Paar Rheometer. The gel sample was placed on the rheometer plate and a gap size of 0.3mm was used. Oscillatory strain of 2% strain was used with a frequency sweep of 0.1-100Hz.