subtle changes increased the temperature of gelation to 40°C for one substitution (MAX2) and 60°C for two substitutions from 25°C (recorded for MAX1, pH 9). Increased hydrophobicity of the peptide motif results in greater hydrophobic interactions, increased intramolecular folding of MAX and self-assembled gelation at lower temperatures. Further work by the Schneider group lead to the development of TSS1, a three stranded β-sheet peptide that undergoes thermo-responsive hydrogelation at physiological temperature (37°C), supports cell adhesion, cell migration and is non-toxic to mesenchymal stem cells (Rughani et al. 2009).

β-sheet peptides and their variants are the most popular form of short self-assembled peptide hydrogels. However the Woolfson group pioneered several self-assembling fibre peptides based on a heptad repeat (seven amino acids) that forms an alternative α-helical coiled-coil secondary structure (Banwell et al. 2009). An amino acid sequence of *abcdefg*, forms the heptad template where position *a* and *d*, are occupied by hydrophobic residues, and *e* and *g* are charged moieties. Assembly and hydrogel formation are driven by a hydrophobic: charge balance where *a* and *d* are buried within the coiled-coil interface and electrostatic interactions between *e* and *g* stabilize the structure. Successful hydrogelation was demonstrated when two separate cationic and anionic (*g* and *e*) heptads were mixed. A thermo-responsive α-helical coiled-coil system was created by introducing hydrophobic alanine at positions *b*, *c* and *f*. As *b*, *c* and *f* are responsible for the interactions of coiled-coils at the interface between heptad dimers, the presence of alanine at these positions increased hydrophobic interactions at the exposed coiled-coil surface. Mixing of alanine containing peptide self-assembling fibres IAALKAK-IAALKAE-IAALEAE-NAALEAK with IAALKAK-NAALKAE-IAALEAE-IAALEAK forms a hydrogel with increased gel strength at higher temperatures due to mainly hydrophobic interactions. Replacing alanine with glutamines at positions *b*, *c* and *f* (to form a mixture of: IQQLKQK-IQQLKQE-IQQLEQE-NQQLEQK with IQQLKQK-NQQLKQE-IQQLEQE-IQQLEQK) increases hydrogen bond formation between coiled-coil dimers and reduces hydrophobic interactions. Upon heating these hydrogels melt due to breaking of hydrogen bonds thus reversing the peptide's response to temperature. Mixing of two different self-assembling fibre peptides also serves to allow greater control over gelation temperature. Stupp's hydrophilic peptide $C_{16}H_{33}$-VVVAAAEEE-COOH forms a hydrogel when subjected to increased temperature/heat treatment at 80°C and cooling to 25°C (Hartgerink et al. 2001). Heating drives alignment of fibrils over macroscopic scales, increasing solubilization and allowing hydrogel formation upon return to 25°C. The contribution of the hydrophobic tail to the overall hydrophobic: hydrophilic balance, and thus its importance to thermo-responsive hydrogelation of peptide amphiphiles cannot be underestimated (Gore et al. 2001).

Silk-elastin-like polymers (SELP) are a class of larger polypeptides of repeating silk fibroin (GAGAGS) and mammalian elastin (GVGVP) amino acid residues often synthesized by genetic engineering techniques. SELP hydrogels have been studied for a variety of drug delivery purposes, including delivery of plasmid DNA, adenoviral vectors, vitamin B_{12} cytochrome C and theophylline (Dinerman et al. 2002; Megeed et al. 2004). Substitution of glutamic acid for valine in the elastin segment has been proven to induce thermo-responsive. Replacement of the ionisable glutamic acid with more hydrophobic valine results in a more hydrophobic polymer that requires a