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This proposal is representative of the projects currently on offer in our group. For more details of active research projects, please visit our webpage at: [http://www.chem.leeds.ac.uk/People/Wilson.html](http://www.chem.leeds.ac.uk/People/Wilson.html)

**Synthetic Hydrogen-Bond Assembled Polymeric Materials**

The purpose of this project is to incorporate hydrogen-bonding motifs into a range of polymeric building blocks and demonstrate that this engenders the materials with novel stimuli response properties.

Biopolymers and their assemblies have a diverse range of 3-dimensional tertiary and quaternary structures dictated by hierarchical organisation of primary monomer sequence. In contrast, synthetic polymers, despite their revolutionary impact on quality of life, are limited by a low level of monomer diversity and sequence control during synthesis. Supramolecular polymers (i.e. those that change their properties in response to temperature, solvent, light or chemical additives) bridge this gap. Their properties like those of biopolymers, are governed by the non-covalent interactions that give rise to defined folded or aggregated architectures. Thus, synthesis of polymers by linking the monomers/macromonomers via non-covalent interactions, or of polymer networks by using non-covalent interactions of functionalized side chains as is illustrated in the adjacent cartoon, is now being widely explored.\(^1\) Hydrogen-bonds are attractive because they are highly directional and when several are used in concert – result in strong and selective binding. This project will build on prior research concerned with the design of linear arrays of hydrogen-bonds.\(^2,3\) There are opportunities to design and synthesize new motifs and to study their fundamental supramolecular chemistry. There are further opportunities incorporate such building blocks into small molecules and polymers (e.g. by end functionalisation of telechelics and controlled radical polymerizations such as RAFT) and explore the resultant self-assembly properties. Such self-assembling polymers are anticipated to have a wide range of applications e.g. in tissue engineering, drug delivery and molecular electronics.

This multidisciplinary project will provide opportunities for the student to receive training in synthetic chemistry, polymer synthesis, supramolecular chemistry and materials characterisation. The project falls within a wider collaboration involving groups in Physics, the Materials Centre in Manchester and Huntsman Polyurethanes.

Please contact Dr. Andy Wilson ([A.J.Wilson@leeds.ac.uk](mailto:A.J.Wilson@leeds.ac.uk)) for further details about this opportunity.

**References**