Conjugated polymers have the potential for use in next generation thin film technology. They can be used in a wide variety of devices ranging from solar energy, organic light emitting diodes, sensors and lasers. Their solution processability gives them the unique ability to be ink-jet printed resulting in ultra-thin, flexible, low cost devices. One of their main potential applications is in organic solar cells which could help end our reliance on fossil fuels. However, virtually all the precursors used in their synthesis are obtained from the petrochemical industry. The aim of this project is to synthesis the first conjugated polymer which would be potentially bio-sustainable, thus potentially providing green energy from a green carbon source.

Scheme 1: Synthesis of biosustainable conjugated polymer (i) NH3, I2, THF ii) isopropyl succinate, tert-butanol iii) H2, Pd/C; PPh3, NBS iv) K2CO3, 18-C-6, DMF v) NBS, DCM vi) Pd(PPh3)4

Starting from furfural and farnesol, which are both derived from biomatter, the synthesis will involve a variety of functional group interconversions and cyclisations to produce a soluble biosustainable donor-acceptor type conjugated monomer. This will then be co-polymerised with a furan co-monomer to afford a novel conjugated polymer. Towards the end of the project greener alternatives to the required Stille polymerisation may be attempted.

References