**Microorganisms for Sustainable Synthesis**

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Designer microorganisms are transforming the modern chemical industry. Using recombinant DNA technologies, cellular metabolism can be controlled and redirected to assemble small molecules of industrial importance directly from renewable feedstocks (e.g. sugar, CO2, CH4) in one-pot by fermentation. This includes the use of industrial ‘waste’ as carbon feedstocks (e.g. lignin, PET) to enable the creation of circular economies. In my talk I will discuss our recent work on the use of engineered microorganisms to produce the platform chemical adipic acid from lignin and other industrial waste streams. In addition to using microbes for total synthesis, I will also outline our most recent work on the use of living bacteria to deliver chemical reagents in situ (i.e. ‘Nature’s syringe pump’) – specifically, the use of microbial H2(g) for Pd catalysed alkene hydrogenation.