Using MS to probe the nature of hybrid homogeneous/heterogeneous organometallic catalysts

The National Mass Spectrometry Centre has assisted with a research programme which is focused on the use of hybrid homogeneous/heterogeneous catalysts. The fundamental premise of this research is to capitalise on the well known advantages of homogeneous catalysts (easily tuned by variation of the ligands, well-understood reaction mechanism etc) with those of heterogeneous systems (easy of separation from products, high surface areas etc). To this end, we have coupled a series of homogeneous ruthenium-based catalysts with super-acidic polyoxometallates.[1]

One of the fundamental issues surrounding this area is comprehensive characterisation of the new hybrid materials, in particular as dissolution of the solid materials fundamentally alters their structure. The National Mass Spectrometry Centre has assisted by running MALDI-TOF experiments on the hybrid materials which allows for the observation of ions containing both the ruthenium catalysts and the polyoxometallate. To date, this is the only method which has allowed us to elucidate the direct connectivity between the two components of the catalyst system.