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Solid State Photo Polymerization Via [2+2] Cycloaddition Reaction

Single crystals of organic polymers or the metal complexes of organic polymeric ligands are not known since they are difficult to crystallize by traditional solution methods and therefore, their three-dimensional structures could not be determined by single crystal X-ray crystallography due to lack of single crystals. On the contrary, solid-state reactions offer the crystalline products that cannot be achieved in solution synthesis. For example, highly crystalline organic polymers have been accomplished both thermally and photochemically in the solid state for diacetylenes, diolefins, a triacetylene, a triene, etc. In this respect polycyclobutane generated by the solid state [2+2] cycloaddition of 2,5-distyrylpyrazine is an interesting class of crystalline organic polymers. Such an organic polymer containing cyclobutane rings can be introduced into a metal-organic framework (MOF) if the conjugated C=C bonds are infinitely aligned closely in a slip-stacked manner such that one C=C bond pair is aligned between any two adjacent spacer ligands in the MOF. We have succeeded in making single crystals of a one-dimensional Zn(II) coordination polymer fused with an organic polymer ligand made *in situ* by [2+2] cycloaddition reaction of a six-fold metal-organic framework. This organic polymer ligand can be depolymerised in a single-crystal to single-crystal (SCSC) fashion by heating. We have extended this strategy to make a range of monocrystalline metal organo-polymeric complexes. Such highly monocrystalline metal complexes of organic polymers were hitherto inaccessible for materials researchers. The details will be discussed during the talk.

Biography

JJ Vittal received his PhD from Indian Institute of Science, Bangalore. He is currently a Professor in the Department of Chemistry, National University of Singapore. JJ's broad research interests include solid state chemistry, inorganic materials and crystal engineering. He published more than 450 research papers and a number of authoritative reviews. He edited several special issues of the journals, co-edited two books and co-authored a textbook in crystal engineering. His current h-index is 62 and cited about 16,000 times.

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