

Singh, Y.; Jayaraman, N., 2017, "Visual Detection of pH and Biomolecular Interactions at Micromolar Concentrations Aided by a Trivalent Diacetylene-Based Vesicle", *Macromol. Chem. Phys.*, 218, 1700039 (1 - 11).

One dimensional conjugated polydiacetylene arise a sustained interest among researchers across various fields, as a result of their manifold characteristic properties, primary among them is the chromoisomerism property, which can be induced by an external stimulus. Due to this immense property, a large number of chemo- and biosensor studies were advanced involving this class of conjugated polymer. Monomers constituting the polydiacetylene structures are primarily mono-diacetylenes and few bis-diacetylenes in the studies so far. We herein report a new trivalent tris-(diacetylene) monomer, which undergoes a facile vesicle formation in aqueous solutions. A low micromolar concentration of the vesicle monomer is sufficient to engage topopolymerization. Aq. vesicle solution exhibits reversible chromism changes as pH varies between 7 and 13. Thin films of the poly(tris-(diacetylene)) respond to temperature variations through chromatic transitions. Having first established the chromatism properties, we expand the scope of the new trivalent diacetylene towards biosensing, wherein we find that the topo-polymerization of the monomer is sufficient as a probe to monitor a biomolecular recognition event by naked eye visualization. The event is enabled through functionalizing the monomer with a chosen sugar ligand, topopolymerization of such a functionalized monomer in presence of a relevant protein receptor. The event could be visualized at concentrations as low as 10 μM of the monomer ligand, representing a 2-3 orders of magnitude higher in sensitivity than that is known so far. The novelty presented in this work expands the scope of poly(diacetylene) in a new, hither-to unknown perspective, wherein probe formation alone can be a novel method to monitor an interaction.