Title:	Analyzing Catalytic Co-operativity and Membrane Parameters in a Substrate-driven Vesicular Assembly Modified by Nucleotides
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Abstract:	Rationalizing changes in functional properties by an exogenous module in a synthetic nanoscale self-organized system has broader significance in designing responsive biomimic materials having application in catalysis to therapeutics. Herein, we have developed a substrate-driven nanoscale vesicular assembly of a metallosurfactant (with dipicolylamine co-ordinated with zinc ion as headgroup) which simultaneously acts as a cooperative catalyst for the hydrolysis of the RNA-model substrate, 2-hydroxypropyl-4-nitrophenylphosphate (HPNPP). We have found out that both purine and pyrimidine-based nucleoside monophosphates interact differently with the assembly, modulating the rate of catalytic cleavage. The different means of recognition of the nucleobases leads to alteration in membrane fluidity as well as surface charge of the vesicular aggregates whether the assembly is in catalytically active or inactive state. Then a systematic pattern for different nucleotides mediated vesicular nanoscale assembly composed of a catalytically-active surfactant by statistically corelating alteration in dynamic membrane parameters (fluidity, surface charge) with its co-operative phosphodiester hydrolyzing ability has been generated using principal component analysis as statistical tool. Overall, it showed a unique response pathway of a co-operative functional assembly to different exogenous modules, and this perception of the deconvolution of collective property opens up an avenue for future development of advanced adaptive systems.
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