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Polyoxometalate (POM) Nanocluster-Induced Phase Transition and Structural Disruption in Lipid Bilayers. BENXIN JING, Y. ELAINE ZHU, Department of Chemical and Biomolecular Engineering, University of Notre Dame, Notre Dame, Indiana 46556, United States, MARIE HUTIN, LEROY CRONIN, School of Chemistry, University of Glasgow, Glasgow G12 8QQ, United Kingdom, CRONIN GROUP OF COMPLEX CHEMICAL SYSTEM COLLABORATION — Polyoxometalate (POM) nanoclusters that are transition metal oxygen clusters with well defined atomic coordination structures have recently emerged as new and functional nanocolloidal materials used as catalysts, anti-cancer medicines, and building blocks for novel functional materials. However, their implications to human health and environment remain poorly investigated. In this work, we examine the interaction of highly charged anionic POM nanocluters with lipid bilayers as a model cell membrane system. It is observed that upon the adsorption of anionic POMs, lipid dynamics is significantly suppressed and lipid bilayers are disrupted with resultant pore and budding-like structural formation. Direct calorimetric experiment of POM interaction with lipid bilayers of varied lipid compositions confirms the POM-induced fluid-to-gel phase transition in lipid bilayers, due to strong electrostatic interaction between POM nanocluster and lipid head groups.

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