

Abstract Submitted
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Observation of Iron Specific Interaction with a Charge Neutral Phospholipid¹ WENJIE WANG, HONGHU ZHANG, SHUREN FENG, JOSUE SAN EMETERIO, Ames Laboratory, Iowa State University, IVAN KUZMENKO, Argonne National Laboratory, MARIT NILSEN-HAMILTON, SURYA MALLAPRAGADA, DAVID VAKNIN, Ames Laboratory, Iowa State University — Using surface sensitive X-ray scattering and spectroscopic techniques we show that phosphatidyl choline (PC) head groups attract positively charged iron ions and complexes even at pH values that are lower than 3. DPPC (1,2-dipalmitoyl-sn-glycero-3-phosphocholine) is a zwitterionic lipid typically used as a model system for cell membranes. Within a large pH range (3 -11), it carries a negative charge on the phosphate group and a positive charge on the quaternary ammonium cation, thus appears charge neutral. Further lowering the pH, i.e. adding a proton to the phosphate group, results in a positively charged headgroup. Surprisingly, we detect significant enrichment of iron at the interface of the DPPC monolayer and the aqueous subphase with the pH maintained at 3 or even lower. With a supposedly charge neutral or even positive surface, the observation of surface bound, charge positive iron ions or iron hydroxides is counter-intuitive and suggests iron-specific interaction with the phospholipid headgroup, which is not governed by electrostatic interaction. The effect of the integration of Mms6, a membrane protein that promotes the formation of magnetic nanocrystals, into the DPPC monolayer will also be discussed.

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