

# **Humic and Fulvic Acids at the Ferrihydrite-Water Interface: Insights on Binding Dynamics, Energetics and Kinetics from Flow Adsorption Microcalorimetry**

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The sorption of organic molecules at the mineral-water interface evolve not as a single homogenous reaction, but as a series of reactions – each with a distinct evolutionary pattern, average binding strength and rate. This is especially true in natural systems; with their diversity of reactive minerals and solutes comprised of complex mixtures of small to macro-organic molecules of diverse functional moieties. Given the central role that mineral-organic interactions play in key agronomic/environmental processes (including water and nutrient cycling, carbon sequestration and pollutant transport) the continual refinement of our fundamental understanding of the what, where, when, how, how fast and how strong of mineral-organic interactions is necessary. By using high resolution energy flow measurements made for the sorption of reference humic and fulvic acids to ferrihydrite, the presentation will provide new insights into the interplay between mineral-organic binding characteristics (i.e evolutionary pattern, binding strength and binding kinetics) and agronomic/environmentally relevant outcomes in soils/sediments e.g. water repellancy, mineral protection of organic matter, bioavailability of nutrients and pollutant transport.