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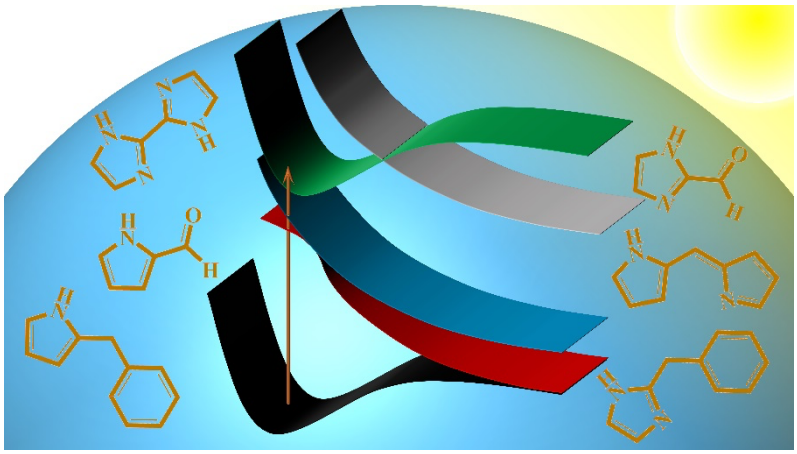
Shining New Light on the Atmosphere's Sunscreen: A Molecular-Level Study of Light-Absorbing Chromophores in Brown Carbon Aerosols



Organic carbon molecules in the atmosphere are emitted by both plants and humans and play a key role in atmospheric chemistry, air quality, and climate. Most organic molecules can absorb UV and infrared but do not absorb much in the visible region of the solar spectrum. Recently, studies have focused on organic molecules with chromophores that can absorb in the near UV (300-400 nm) and visible regions, termed "brown carbon" (BrC). These molecules are found in both the gas phase and in the condensed phase in aerosols and cloud droplets. Direct absorption of solar radiation by gas phase BrC molecules can lead to the formation of radicals that can further oxidize other atmospheric organic molecules. In the condensed phase, BrC can warm and help evaporate cloud droplets as well as drive secondary reactions with other condensed phase organic material. These impacts are relatively unconstrained in climate models now due in part to a lack of data on the sources and lifetimes of these molecules in the atmosphere. This talk will focus on a molecular-level perspective of aerosols, shining light on the solar absorption outcomes of BrC chromophores.