

From Interstellar Ices to PAHs

A symposium to honor Lou Allamandola's Contributions to the Molecular Universe
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INVITED TALK

Photochemistry of PAHs in Cosmic Water Ice

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Three polycyclic aromatic hydrocarbons (PAHs) in various concentrations of water ice were investigated via IR spectroscopy to study the effects of H₂O concentration on the formation of photoproducts, when each ice mixture is exposed to UV radiation. We report mid-IR spectra of three neutral PAH:H₂O ice mixtures; the PAHs included in the study are anthracene, pyrene and benzo[ghi]perylene, extending studies by Bouwman et al. 2011. We conclude that lower concentration of PAHs in a water matrix results in faster photoproduct formation, and more efficient degradation of the PAHs and their photoproducts. However the efficiency of photolysis is not linear with concentration, and instead appears to decrease again at larger PAH:H₂O ratios near 1:1000. The details of this analysis will be shared in detail, and compared to 5-8 micron astronomical observations (Boogert et al. 2008) of dense molecular cloud cores.

In the last part of the talk, we will introduce a new space mission concept under development at NASA Ames. This concept aims to expose a range of PAH samples in contact with ices and mineral surfaces to space radiation, and to observe the changes in situ with FTIR and/or Raman spectroscopy. We will share the primary science questions this mission concept hopes to address, and solicit feedback from conference participants.

REFERENCES

- Bouwman, J., Mattioda, A. L., Linnartz, H., & Allamandola, L. J. (2011) *A&A*, 525, A93
Boogert, A, Pontoppidan, K., Knez, C., et al. (2008) *ApJ*, 678, 985