Catalytic Formation of PAHs over Crystalline Silicate Dust Grains

Mark Hammonds (University of Tokyo), Tian Ming (University of Hong Kong), Alessandra Candian (Leiden Observatory), Wang Na (University of Hong Kong), Bing Si Liu (Tianjin University), Erin Smith (NASA Ames), Allan S. -C. Cheung (University of Hong Kong) & Peter J. Sarre (University of Nottingham).

Two important components of the ISM are silicates and PAHs, both of which are observed ubiquitously in a wide variety of astronomical environments. Despite the traditional view that carbon-rich and oxygen-rich chemistry arises in different conditions, numerous post-AGB objects show spectroscopic features originating from both oxygen-rich and carbon-rich chemical species. These "mixed chemistry" objects are likely sites of PAH formation, as evidenced by strong infrared emission arising in, for example, the Red Rectangle nebula. This is explored experimentally and PAHs are shown to form catalytically over heated crystalline olivine from an acetylene gas precursor. An observational study is also presented of AFGL 2688, the Egg Nebula, which shows evidence of a spatial correlation between PAH and silicate emission. Implications and possibilities for further work are discussed.