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## Comparison of organics in residues formed from UV irradiation of astrophysical ices with cometary samples from Stardust

Michel Nuevo<sup>1\*</sup>, Stefanie N. Milam<sup>2</sup>, Scott A. Sandford<sup>1</sup>, George D. Cody<sup>3</sup>,  
Bradley T. De Gregorio<sup>4</sup>, A. L. David Kilcoyne<sup>5</sup>, Rhonda M. Stroud<sup>1</sup>

<sup>1</sup>NASA Ames Research Center, USA, <sup>2</sup>NASA Goddard Space Flight Center, USA,

<sup>3</sup>Carnegie Institution of Washington, USA, <sup>4</sup>Naval Research Laboratory, USA, <sup>5</sup>Advanced Light Source, USA

The NASA Stardust mission successfully collected authentic cometary grains from Comet 81P/Wild 2.<sup>1,2</sup>X-ray absorption near-edge structure (XANES) spectroscopy analysis of these samples indicates the presence of O-rich and N-rich organic materials, which contain a broad variety of functional groups (carbonyls, C=C bonds, aliphatic chains, amines, amides, etc.).<sup>3</sup>One component of these organics contains very little aromatic carbon and resembles the organic residues produced by the irradiation of interstellar/cometary ice analogs. Stardust samples were also recently shown to contain the amino acid glycine.<sup>4</sup>Organic residues produced from the UV irradiation of astrophysical ice analogs are already known to contain a large suite of organic molecules including amino acids,<sup>5,6,7</sup> and amphiphilic compounds (fatty acids).<sup>8</sup>In this work organic residues were produced in the laboratory from the UV irradiation of mixtures of ices containing H<sub>2</sub>O, CH<sub>3</sub>OH, CO, and NH<sub>3</sub> in relative proportions 100:50:1:1 at 7 K. Additional residues were produced from mixtures containing no NH<sub>3</sub>, and mixtures containing alkanes and/or naphthalene (C<sub>10</sub>H<sub>8</sub>). C-, N-, and O-XANES spectra of these residues were measured in order to assess the organic functional group chemistry and overall atomic composition of these residues, as well as their C/N/O ratios. Preliminary results indicate the presence of a number of chemical bonds and functions (carbonyls, C=C bonds, alcohols, amides, amines, and nitrile groups), whose relative proportions will be compared with XANES measurements of Stardust samples.<sup>9</sup>

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