Geophysical Research Abstracts,
Vol. 11, EGU2009-9744, 2009
EGU General Assembly 2009

Spectral properties of ion irradiated carbon rich solids

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Carbon rich solid materials have been studied before, during, and after ion irradiation (3-400 keV ions) by in situ reflectance spectroscopy (from UV to IR). Frozen hydrocarbons (benzene, methane, butane, acetylene, etc., also mixed with water ice) have been irradiated at low temperature with fast ions. Irradiation causes the formation of many molecular species and of a long chain polymer like material (organic refractory residue). The process mimics what occurs in space because of cosmic ion irradiation of the icy surfaces of some objects in the Solar System. Other irradiated materials include natural bitumens (Asphaltite, kerite) and polymers (i.e. polystyrene). Upon irradiation the originally transparent polymer samples are converted in a material that, already at low doses, strongly absorbs in the UV. Such materials could mimic a kind of organic material (i.e. a spectrally neutral one) freshly exposed at the surface of minor objects in the Solar System because of meteoritic impact.