RESULTS FROM VUV SPECTROSCOPY OF NEUTRAL DIAMONDOID MOLECULES AND IR SPECTROSCOPY OF THE CATIONIC SPECIES

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Due to their stability, diamond materials are expected to be present in different environments of the interstellar medium[a]. Indeed, nanometer size diamond cristals have been extracted from carbonaceous chondrites[b] and two emission features (observed at 3.43 μm and 3.53 μm) in the spectra of HD 97048 and Elias1 have been assigned to these species[c]. Despite this high astrophysical relevance, very few is known about the structural properties and dynamics of the molecular building blocks of larger species : the diamondoid molecules. These molecules consist of sp3 hybridized carbon cages where dangling bonds are terminated by hydrogen atoms. The infrared spectra of neutral molecules conforted the assignment of the 3.43 μm and 3.53 μm emission features to nanometer size diamondoid systems[d]. In order to improve the understanding of the possible process leading to the IR emission features, we recorded the IR spectra of the deshydrogenated cationic species of adamantane, diamantane and triamantane (using Infrared Multi Photon Dissociation technique with the free electron laser FELIX) as well as the VUV spectra of adamantane and diamantane (obtained thanks to the Threshold Photo Electron Photo Ion Coincidence technique at the DESIRS beamline of the synchrotron SOLEIL). We will show the results of these spectra and the preliminary analysis.

[a] Saslaw and Gaustad, Nature, **221**, 160 (1969)
[b] Lewis et al., Nature, **326**, 160 (1987)
[c] van Kerckhoven et al., Astronomy and Astrophysic, **384**, 568 (2002)
[d] Pirali et al., The Astrophysical Journal, **661**, 919 (2007)