**CAN BIOSIGNATURES BE DETECTED ON THE SURFACE OF EUROPA THROUGH REMOTE SENSING? A LABORATORY STUDY ON THE PENETRATION DEPTHS AND REACTIONS OF ELECTRONS WITH ORGANICS.** Murthy S. Gudipati[1], Irene Li[1], and Antti A. Lignell[1,2], [1]Science Division, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, [2]Academy of Finland Post-doctoral Fellow.

**Introduction:** One of the important goals of the future EJSM flagship mission is *habitability*. The predicted subsurface oceans, tidal-stress driven dynamo for energy, and possible presence of organics and minerals could be a perfect place for life on Europa. The key question is, "can the signatures of life be detectable through remote sensing or would a subsurface probing be inevitable on potentially habitable surfaces that are exposed to radiation?

**Laboratory Investigations:** We have carried out laboratory studies using PAHs (as biomarker surrogates) doped ices and low-energy electrons as the degradation source, to simulate the surface and subsurface of Europa. PAH concentration was monitored using UV-VIS spectroscopy. Production of IR-active molecules was monitored using FTIR spectroscopy simultaneously on the same probe. Ice thicknesses were accurately determined, ranging from several hundreds of nm to a few micrometers. Electrons with 5 eV – 2000 eV energy were used to simulate secondary electrons generated during high-energy electron penetration of icy surfaces.

**Infrerence:** Experimental data and modeling revealed that electrons penetrate far deeper to degrade PAHs than predicted by the existing models for a given electron energy. We have also observed that PAHs are completely degraded leaving no trace of organics to be seen in the UV-VIS spectra, indicating that sould organics be present on the ice surface, they would be subjected to a complete diagenesis in a given time period, which would be dictated by the radiation energy and flux.

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