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Far-Infrared Synchrotron spectra of Titan's cyanide haze

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Titan is Saturn's largest moon and is the only planetary body in our solar system with a dense atmosphere that is comparable to Earth. Photochemical processing of the two major atmospheric components (N2 and CH4) produce a suite of hydrocarbon and nitrile species, from small hydrocarbons to large complex organic molecules (COMs) and polymeric nitriles (tholins). Tholins aggregate and coagulate to form suspended aerosols that descend in altitude from the stratosphere and settle on the surface of Titan. These complex molecular systems are responsible for the seasonal far-infrared absorption feature at 220 cm-1 that remains unassigned.

Despite the abundance of observational data from the recent Cassini-Huygens space probe to the Saturnian system, there are few experimental infrared analyses on nitrile aerosols under temperatures and pressures simulating Titan's atmosphere. Laboratory far-infrared studies can elucidate the temperature, pressure and particle size dependence on infrared signatures of pure and mixed aerosols. Without such experiments, the fundamental morphology and identification of the unassigned far-infrared band feature of these nitrile aerosols remain unresolved.

In this talk, we present the first infrared studies of nitrile-hydrocarbon and nitrile-water binary aerosols under conditions replicating the Titan atmosphere. We utilize the specialized enclosive-flow-cooling-cell (EFC cell) that is coupled to the THz/Far-IR beamline at the Australian Synchrotron. This is the only setup in the world that has the capabilities to study the far-infrared of aerosols like those detected on Titan. Here, our laboratory data will be compared and validated against Cassini mission data.

Keywords or phrases (comma separated)

Are you a student?

Yes

Do you wish to take part in</br>the Student Poster Slam?

Yes

Are you an ECR? (<5 yrs</br>since PhD/Masters)

No

What is your gender?

Female

Primary author(s) : Ms AUCHETTL, Rebecca (La Trobe University)

Co-author(s) : Dr ENNIS, Courtney (La Trobe University); Dr ROBERTSON, Evan (La Trobe University); Mr RUZI, Mahmut (Latrobe University)

Presenter(s) : Ms AUCHETTL, Rebecca (La Trobe University)

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