Title: Serpentinization of iron-rich olivine and its potential for abiotic methane synthesis in planetary bodies

Abstract:
Serpentinization of olivine-rich ultramafic rocks are increasingly recognized to have been widespread in the solar system throughout its history. This process has gained particular attention among planetary scientists because it generates molecular hydrogen (H2) and methane (CH4), compounds that can supply metabolic energy to biological communities and contribute to greenhouse warming of planetary atmospheres. Following this, the talk will demonstrate a series of natural (meteorites) and experimental observations as well as thermodynamic models to show the pattern of secondary mineral formation and H2 generation during serpentinization of olivine as a function of Fe content and temperature.
It will also be shown that serpentinization of Fe-rich olivine can generate substantially greater amounts of H2 per mole than is observed for serpentinization of Mg-rich olivine, depending on the magnitude of Fe (III) partitioning into serpentine phase. Thus, serpentinization on planetary bodies may have a greater potential to supply H2 vis-à-vis CH4 to support biological communities and enhance the atmospheric greenhouse warming than analogous processes on Earth.