Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **3475** Type: **Invited Speaker / Conférencier(ère) invité(e)**

(I) Confirming internal microwave resonances in grape-sized aqueous objects using calorimetry, thermography, and FEM simulations

Thursday 9 June 2022 10:45 (30 minutes)

The localized and intense electromagnetic hotspots afforded by plasmonic resonances in nano-scaled metallic objects have led to many exciting biomedical applications. The equivalence between nanoplasmonic hotspots, and those due to morphology-dependent resonances in high-index dielectrics is a promising avenue of nanophotonic research. In the microwave frequency regime water is such a material (n˜9), and thus cm-sized aqueous dielectric objects can become resonant to few-GHz light from microwaves, WiFi, and other communication-band sources. We are using experimental, analytical, and computational approaches for studying hotspots in aqueous monomer and dimers. Evidence for microwave resonances in grape-sized objects has been somewhat circumstantial; relying on preliminary thermal imaging and FEM simulations. Now, using a creative and relatively low-tech calorimetric approach, we have strong evidence for a fundamental volumetric resonance in isolated hydrogel spheres. Furthermore new free-space thermal imaging experiments elucidate the transition from dipole-like resonance in isolated spheres to intense hotspots at the nexus of dimers. These experimental findings are further supported by simulations that can identify which fundamental resonances in spherical monomers hybridize to yield either/both internal and point-of-contact dimer modes.

Author: SLEPKOV, Aaron (Trent University)

Presenter: SLEPKOV, Aaron (Trent University)

Session Classification: R2-1 Applied Physics II (DAPI) | Physique appliquée II (DPAI)

Track Classification: Technical Sessions / Sessions techniques: Applied Physics and Instrumentation / Physique appliquée et de l'instrumentation (DAPI / DPAI)