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Extreme Thermal Transient Hotspots: Physics and Applications of Graphitic Melanin

Tuesday, MAR 8 | Bldg. 101
2 PM | Seminar room on the 1st floor

While photo-luminescence is extensively used for optical spectroscopy and imaging, excitation-induced heat dissipation is generally useless. In extreme conditions however, incandescence could occur and serve the purpose of imaging, but the necessary temperatures are incompatible with the stability of organic molecules and even metallic.

Using the biological pigment melanin, we describe the possibility to generate and image transient thermal radiation pulses in a non-destructive fashion. This optical response is not obtained with molecular solutions, but requires the graphite-like organisation of melanin in micron-sized organelles called melanosomes. Transient temperatures in the 2000°K range were optically measured in aqueous particle suspensions. Beyond the issue of the thermal stability of melanin, we present a model to account for the dynamics of explosive vaporisation of water around hotspots. Our work opens new perspectives to study microscopic spinodal explosions, heat transfers at submicrosecond and submicrometer scales, as well as the use of blackbody radiations sources for imaging and melanoma diagnostic applications.

You are cordially invited to attend!

Tuesday Colloquium