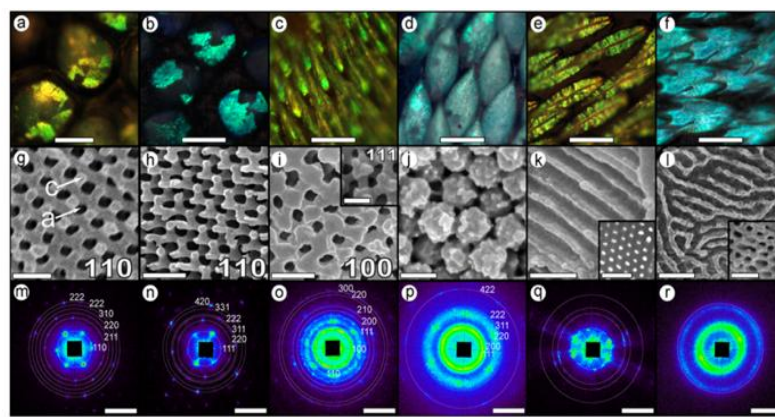




TUESDAY
6
OCTOBER

Vinod SARANATHAN

University of Tours - Tours, France



🕒 11:00am - 12:00am 📍 Salle des thèses - GR L0130 (Tours South)

Biomimetics of biological mesoscopic patterning

Insects are the most numerous animals on Earth. Among organisms, not surprisingly, insects display a remarkable array of structural color producing photonic nanostructures within scale cells sculpted by lyotropic precursors and then back filled with cuticle and later air upon programmed cell death, pre-empting contemporary engineering processes [1-3]. These features are intra-cellularly self-assembled at the hard to achieve mesoscopic length scales (100-500 nm), i.e., in the visible regime. Currently, lithographic techniques are restricted to near IR, whereas nanostructures with smaller lattice parameters fabricated via 3D-printing (stereolithography) followed by heat shrinkage are defect-ridden, not scalable or sustainable [4]. Organismal nanostructures (in insect wing scales) can also be patterned mechanically by buckling (including hierarchically) producing sub-micron features that rival our most complex designs for flexible electronics and soft robotics. In this talk, I will summarize how biology patterns multi-functional nanostructures and conclude with some biomimetic lessons for engineering.

- [1] V Saranathan *et al.* 2010. Structure, function, and self-assembly of single network gyroid (I4(1)32) photonic crystals in butterfly wing scales. ***PNAS*** 107, 11676-11681
- [2] V Saranathan *et al.* 2015. Structural Diversity of Arthropod Biophotonic Nanostructures Spans Amphiphilic Phase-Space. ***Nano Lett.*** 15, 3735-42;
- [3] V Saranathan *et al.* 2021. Evolution of Single Gyroid Photonic Crystals in Bird Feathers. ***PNAS*** 18: e2101357118
- [4] Y Liu *et al.* 2019. Structural color three-dimensional printing by shrinking photonic crystals. ***Nat. Comms.*** 10, 4340.

📅 Upcoming GREMAN seminars:

Thursday
15
October

1:30pm – How to manage bibliography (A&P site)

Thursday
5
Nov.

1:30pm – to be announced

Tuesday
17
Nov.

11am - to be announced
Journal Club