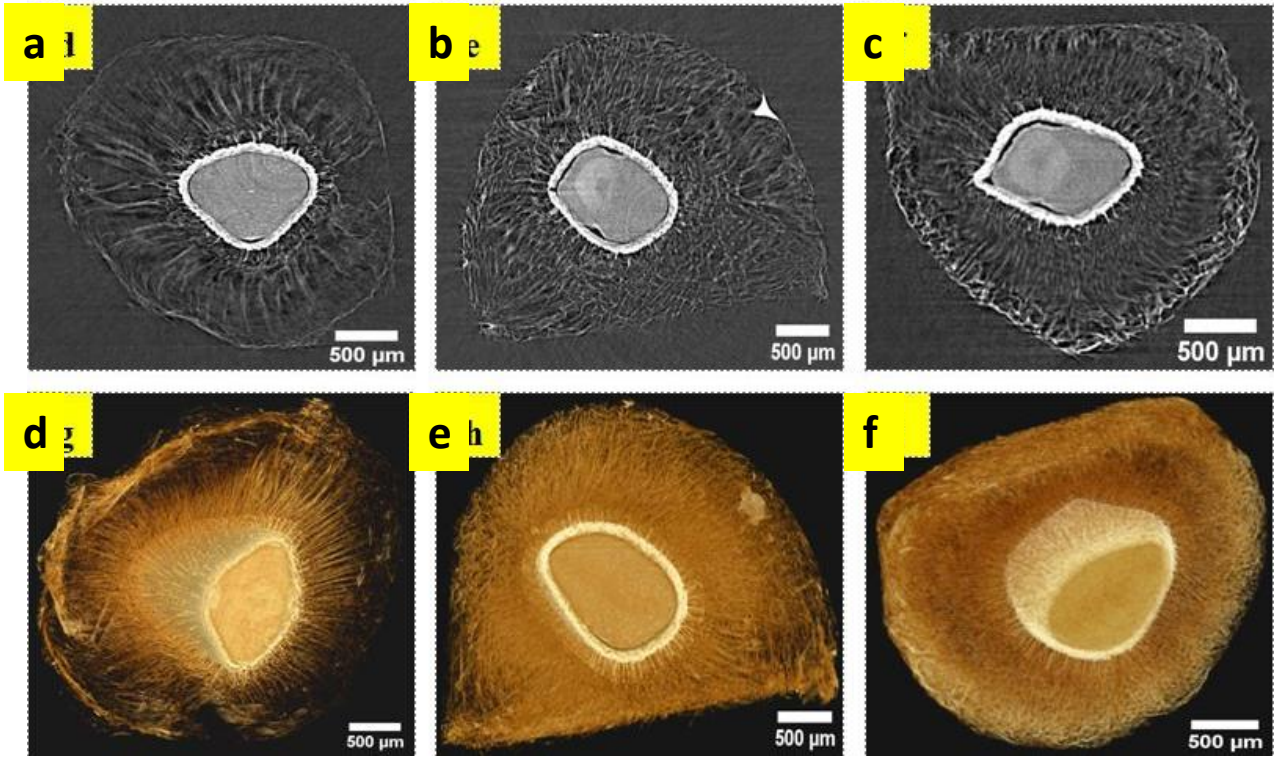
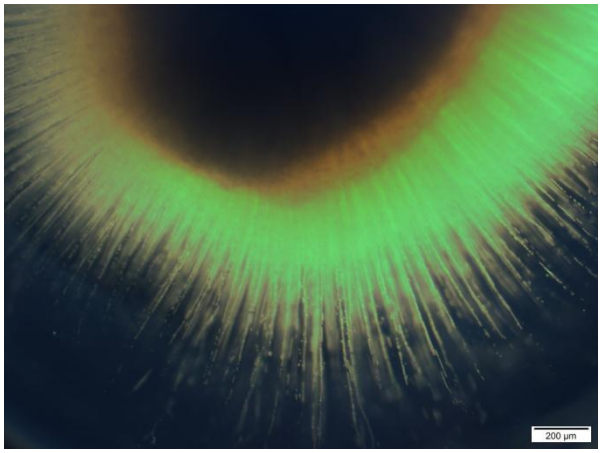
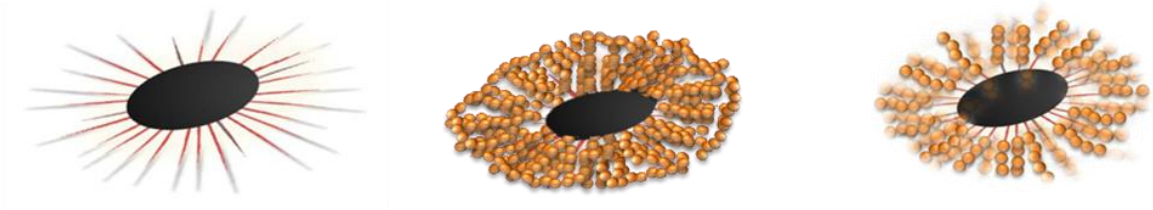
A natural dendritic bio-hybrid silica nanoparticles-*Ocimum basilicum* seeds based immobilizing support for enzyme





Microscopic view of plain swelled seed

SRµCT slice (a–c) and 3D images (d-f) of plain seeds (a, d), Silica@seeds (b, e) and Silica@PEI-seeds (c, f).



Swollen seed **Silica@seed** **Silica@PEI-seed**

Schematic representation of plain seed, Si@seed and Si@PEI-seed

Using *Ocimum basilicum* seed as template, a natural dendritic bio-hybrid (Si@seeds and Si@PEI-seeds) was synthesized. Developed bio-hybrids were characterized through small angle X-ray scattering (SAXS), scanning electron microscopy (SEM), Synchrotron radiation based X-ray micro-computed tomography (SRμCT), Brunauer–Emmett–Teller (BET) and Fourier transform infrared spectroscopy (FTIR). Incorporation of the nanoparticles results to a fourfold increase in the available surface area of the seeds. Immobilized enzyme showed improved physico-chemical properties. Enzyme immobilized bio-hybrids could be easily separated out and reused up to eight times with 82 % retention of enzyme activity. Si@PEI-seeds emerged as best immobilizing support for invertase enzyme.

Present work suggests that the unique features of the natural dendritic bio-hybrid of Si@PEI-seeds could act as a suitable support for immobilization of enzymes.

Publication: **A. Mishra et al., *Colloids & Surfaces B: Biointerfaces***, 2020, 188, 110796. (**I.F. 4.39**)