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Tubulohelical membrane arrays: Novel cellular protein/lipid nanodevices with potentia biophotonic properties

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Complex 3D biophotonic crystal arrays are known for their potential to revolutionize optical communication and computation, but their fabrication is often technologically highly demanding. Therefore, one might consider learning from living cells that have internalized self-assembly of nanoperiodic 3D-arrays of lipid-phase dependent membranes as part of their life-organizing strategy. Elucidation of the formation and function of cellular arrays could inspire applications and technical routes towards the *in vitro* fabrication of 3D structures.

We report on the discovery of cellular 3D-nanoarrays, which are by far more complex than isotropic, photonic properties possessing, ´cubic membranes´. The so-called tubulohelical membrane arrays (TUHMAs) share their non-lamellar lipid membrane characteristics with ´cubic membranes´. In striking sophistication, however, the TUHMAs are anisotropic; their lipid membranes are built around proteinaceous, nucleoporin-containing core tubules, which are confined by helix-like threads. Such presence of nucleoporins is remarkable, since they are otherwise known as stable constituents of nuclear and (cytoplasmic) annulate lamellae pore complexes. Initial observations in the epithelial cell line PtK2 indicate that anisotropic TUHMA structures arise indeed from unprecedented alterations of both lipid and nucleoporin conformation. The timing for the assembly of TUHMAs seems to be related to the cell- and ciliary cycle. The resulting single organelle-like entities in form of TUHMAs preferentially orientate themselves either in parallel or perpendicularly to the cell nucleus. Taken the structural and cellular characteristics together, TUHMAs are promising candidates for assessing possible biophotonic properties and functions in the context of living cells.

Biography

Siegfried Reipert started his carrier as a physicist and electron microscopist in the field of material sciences in Berlin (Germany). In the nineteen's, he changed his research area by completing his M.Sc. and Ph.D. in life sciences from the University of Manchester (UK). He has built up more than twenty years of experience in biological electron microscopy, inclusively of state-of-the-art cryopreparation techniques. Currently, he works as Assistant Professor in the Core Facility Cell Imaging and Ultrastructure Research (CIUS) at the University of Vienna (Austria). He is author and co-author of more than 40 peer-reviewed papers.

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Effect of surface defects on optical and magnetic properties of Tm, Nd doped ZnO Nanoparticles

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This paper reports the study of Tm, Nd doped ZnO nanoparticles synthesized using wet chemical synthesis method. The basic approach is to fabricate the optoelectronic devices, as the luminescent efficiency drastically changes with Tm and Nd doping. Nanophosphors materials such as ZnO have potential applications in high brightness light emitting diode applications. ZnO nonmaterial is one of the promising candidates for general illumination applications due to its high optical transparency and colour tenability. ZnO is a direct wide bandgap (3.3 eV) semiconductor with a large excitons binding energy of 60 meV at room temperature. In the present work, the ZnO nano particles were synthesized using zinc acetate di-hydrate and sodium hydroxide solutions. This technique is based on the preparation of precursor and hydrolysis of the precursor to form the colloid and has been successfully applied for the synthesis of ZnO nanoparticles. The white precipitate was separated out from the solution using centrifuge. Selected area electron diffraction (SAED) and HRTEM also manifests the high-crystalline quality of ZnO. XRD and TEM studies revealed the average particle size to 10 nm and ZnO exhibit in hexagonal phase. Rare earth (Tm and Nd) doped with ZnO 0.01 mol% to 0.05 mol%. The room temperature PL spectra of all the undoped and doped samples revealed one sharp emission band at about 387 nm, generally assigned as a near-band-edge (NBE) emission band, and another broad deep-level emission band extending from 450 to 750 nm.

Biography

Surender Kumar has completed his B.Sc. and M.Sc. in Physics from University of Delhi in 2006 and 2008, respectively. He has submitted the Ph.D. thesis in 2013 from Department of Physics & Astrophysics, University of Delhi. He has published 5 research papers in reputed journals and attended several national and international conferences and presented his research work.

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