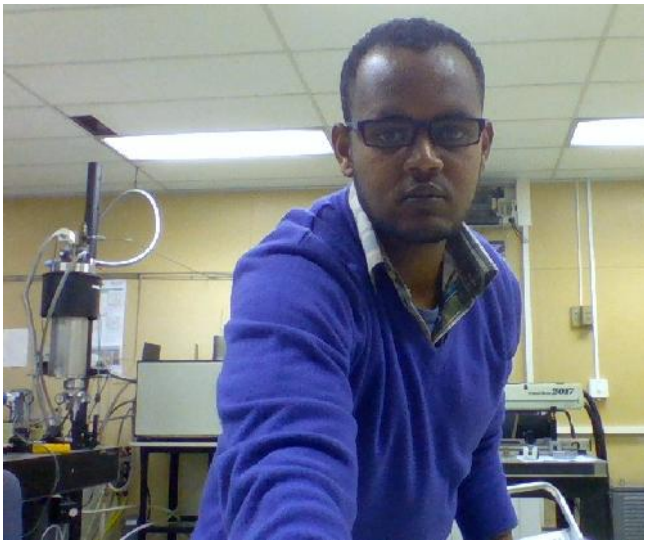


Two dimensional random media composed of core-shell structure embedded in active/passive host medium(ZnO/ZnS, $Zn_{1-X}Y_XO$; Y= Al, Cd, ...)

Leta Tesfaye Jule

Leta Jule is currently a Ph.D. student at University of the Free State, Physics department, QwaQwa campus, South Africa. He has published 4 papers and peer reviewed 2 journal articles for high impacted international journals. He has presented his work on both international and national conferences. The main objective of his project is to study the polarization-dependent light scattering and absorption in random arrays of polydispersed semiconductors composed of core-shell (metal-dielectric). The methods of the study includes experimentally and computationally using FDTD (Finite difference time domain) and COMSOL Multiphysics 5.2 (Commercial solver). The experimental part of the project includes growth of nanorod/nanowires and quantum dots having spherical and or cylindrical shape of ZnO, producing ZnO nanoparticles using thermal decomposition of organic precursor, doping ZnO with different types and concentration of dopant with the motivation to produce 'p' type ZnO. The computational part of the project includes solving Maxwell Garnet mixing equations for composite having different inclusion to calculate the absorption, efficiency and find optimal geometry to achieve super absorption in this materials.

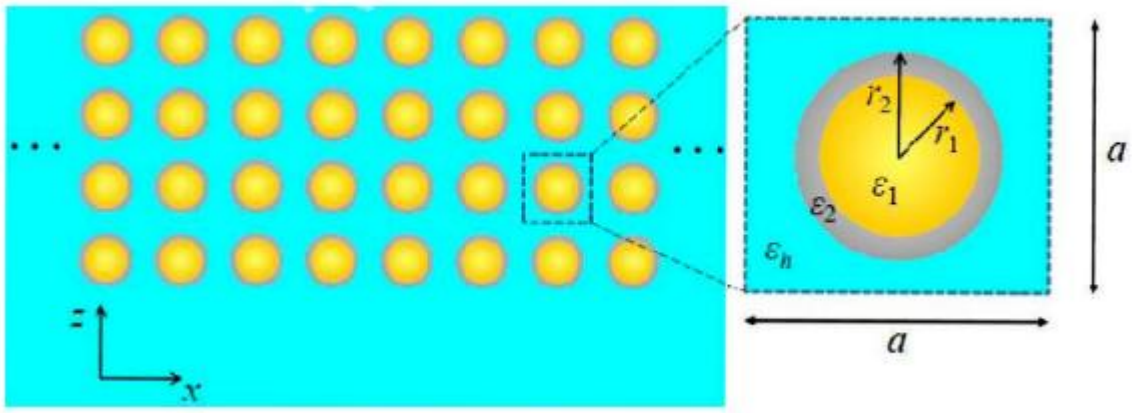
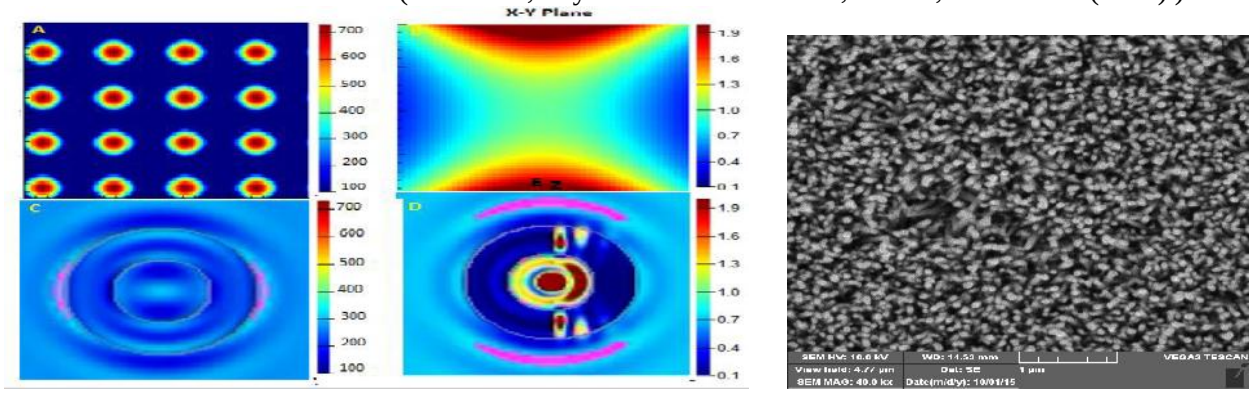


Fig. 1 Model of core–shell nanocomposite consisting of a matrix in which coated spherical particles are embedded in active host matrices (Jule et al., Phys. Status Solidi B **252**, No. 12, 2707–2713 (2015))



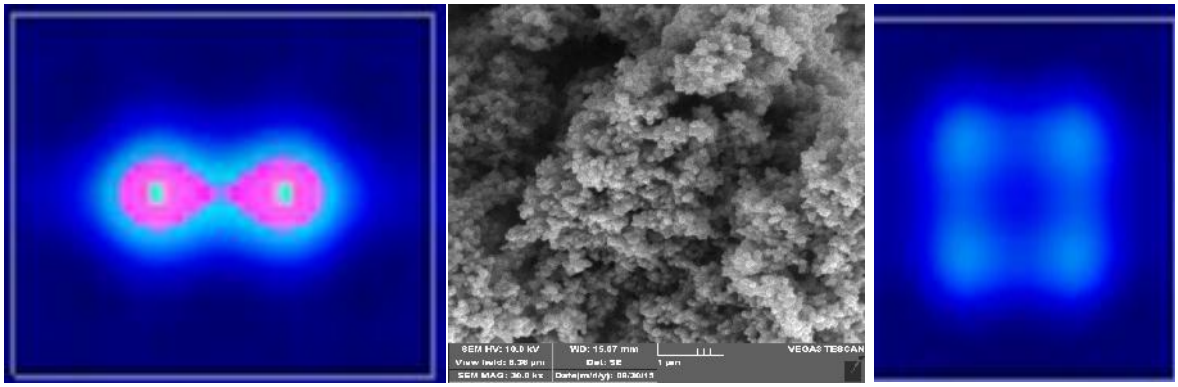


Fig. 2 Two-dimensional plots of the modulus of the local electric field of core–shell structures simulated using FDTD (L. Jule et al. /Optics Communications 380 (2016)186–194)