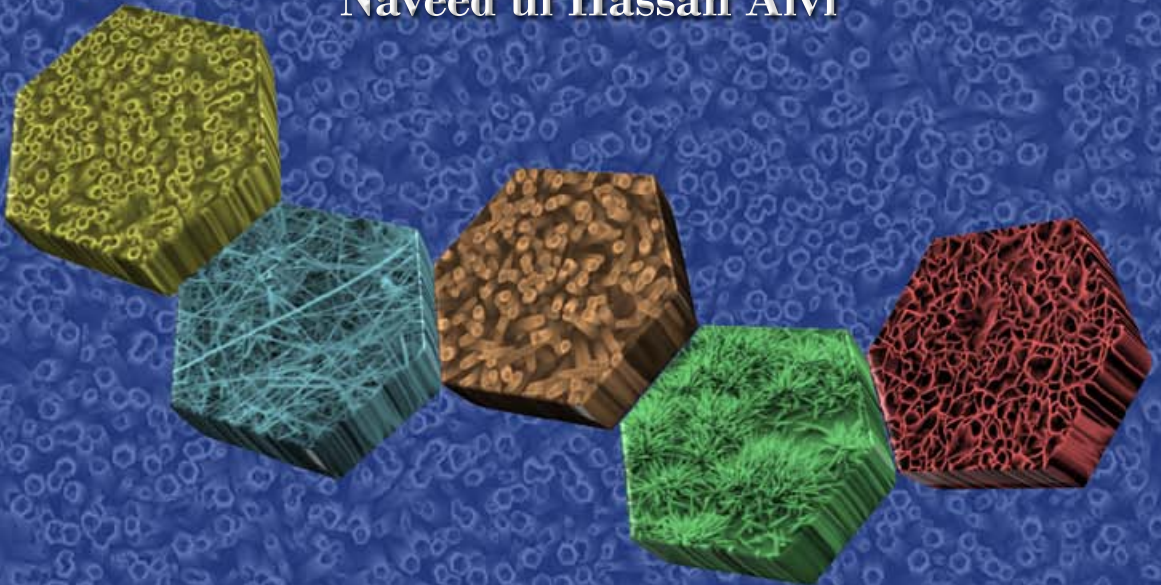


Luminescence Properties of ZnO Nanostructures and Their Implementation as White Light Emitting Diodes (LEDs)

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Now the world is seeking to replace the high energy consumption conventional light bulbs with low energy consumption LEDs. In this way there will be a decrease of the energy consumption by around 20%. According to the recent analysis by the U.S. Department of Energy (DOE), the estimated cumulative energy saving for replacing lighting with LEDs for period spanning 2010-2030 is \$ 120 billion at today's energy prices and it will also reduce the emission of carbon in the environment by 246 million metric ton.

In this thesis, luminescence properties of ZnO nanostructures (nanorods, nanotubes, nanowalls & nanoflowers) are investigated by different experimental & characterization approaches for possible future applications of these nanostructures in white light emitting diodes for general lighting. The nanostructures are grown by low cost aqueous chemical growth (ACG) and vapor liquid solid (VLS) growth techniques. The post-growth annealing technique is used to investigate the origin of red emission in ZnO. The color quality of the fabricated LEDs is also investigated. A relation for junction temperature of the n-ZnO nanorods/p-GaN, p-4H-SiC, p-Si LEDs is also modeled & experiments are performed to validate the model. The influence of helium (He^+) ion irradiation on the luminescence properties of ZnO nanorods/p-GaN LEDs is also investigated for nuclear and space applications.



Naveed ul Hassan Alvi started PhD in Nanotechnology in 2007 under supervision of Prof. Magnus Willander at Department of Science and Technology (ITN), Linköping University Sweden. His research interests are fabrication and characterization of ZnO nanostructures-based devices. He is also involved in research concerning with the UV detection, biosensing and piezoelectric application of ZnO nanostructures. In the above mention research areas he

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