

Near Infrared Active Upconversion Nanophosphors for Theranostics, Sensing and Photocatalysis

A thesis

submitted by

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Dedicated to
Almighty Sri Rama
and
My Beloved Parents



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Declaration by the Research Scholar

I hereby declare that the entire work embodied in this Thesis is the result of investigations carried out by me in the **School of Basic Sciences**, Indian Institute of Technology Mandi, under the supervision of **Dr. Venkata Krishnan**, and that it has not been submitted elsewhere for any degree or diploma. In keeping with the general practice, due acknowledgements have been made wherever the work described is based on finding of other investigators.

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Declaration by the Research Advisor

I hereby certify that the entire work in this Thesis has been carried out by **Mr. Kumbam Lingeshwar Reddy**, under my supervision in the **School of Basic Sciences**, Indian Institute of Technology Mandi, and that no part of it has been submitted elsewhere for any Degree or Diploma.

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Abbreviations

α -CD.....	α -Cyclodextrin
ACN.....	Acetonitrile
AcOH.....	Acetic acid
BET.....	Brunauer-Emmett-Teller
CCM.....	Curcumin
Cys.....	Cysteine
DD.....	Drug delivery
DLS.....	Dynamic light scattering
DOX.....	Doxorubicin
EDAX.....	Energy-dispersive X-ray analysis
EtOH.....	Ethanol
FESEM.....	Field emission scanning electron microscopy
Glu.....	Glutathione
Hcy.....	Homocysteine
HRTEM.....	High resolution transmission electron microscopy
MDR.....	Multi-drug resistance
MB.....	Methylene blue
mSiO ₂	Mesoporous silica
NIR.....	Near infrared
OA.....	Oleic acid
PEG.....	Polyethylene glycol
PBS.....	Phosphate buffer solution
PDT.....	Photodynamic therapy
PEI.....	Polyethylene imine
ReAc.....	Resorufin acrylate
RePr.....	Resorufin propionate
ROS.....	Reactive oxygen species
SAED.....	Selected-area electron diffraction
SPR.....	Surface plasmon resonance

UCL.....	Upconversion luminescence
UCNC.....	Upconversion nanocrystals
UCNP.....	Upconversion nanoparticles
UV.....	Ultra violet
Vis.....	Visible
XRD.....	X-ray diffraction
XPS.....	X-ray photoelectron spectroscopy

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