

**Rational Design and Development of Plasmonic
Photocatalysts for Environmental Remediation and
Organic Transformation Reactions**

A thesis
submitted by

**Ajay Kumar
(D16017)**

for the award of the degree of
Doctor of Philosophy



**School of Basic Sciences
Indian Institute of Technology Mandi
Sep. 2021**

Dedicated to Goddess Gayatri

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. Ajay Kumar**, 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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Acknowledgements

The entire Ph.D. journey has been learning, implementing, experiencing phase of my life. While pursuing my Ph.D. degree, many seen and unseen hands pushed me forward and put me on the right path and enlightened me with their knowledge and experience. This page is the heartfelt acknowledgement to appreciate all those people who helped in one or the other way in this entire duration of Ph.D. I really enjoyed this phase of life as a researcher.

First and foremost, I would like to express my deep sense of gratitude and respect to my supervisor, **Dr. Venkata Krishnan** for his invaluable guidance, support, friendly behavior and persistent enthusiasm during my which facilitated me to accomplish this task of scientific research leading to a Ph.D. degree. I thank him very much for providing me the freedom to explore the possibilities in the area of material chemistry and sharing his wide knowledge and expertise. I very much appreciate his efforts to motivate all group members to present our research activities at numerous conferences, seminars etc. I am highly grateful to him for standing by my side in times of difficulties, solving the problems and encouraging me to progress ahead.

In addition, I render my profound thank to Director, IIT Mandi for his support and encouragement to all research scholars. I wish to place my sincere gratitude to my doctoral committee members, **Dr. Amit Prasad, Dr. Shubhajit Roy Chowdhury, Dr. Subrata Ghosh and Dr. Prem Felix Siril** and for their frequent support and helpful inputs. I have been greatly benefitted by their suggestions regarding the plan of studies and the research work.

The research facility at Advanced Materials Research Center (AMRC), IIT Mandi is gratefully acknowledged. My wholehearted thanks to all former and current AMRC staffs for their assistance in lab and without them it would not be possible to complete the tasks on time. Furthermore, I am thankful to all the library staff of IIT Mandi for their cordial behavior and help whenever required during my stay here.

I would also like to express my sincere thanks to all my collaborators (**Prof. Pedro H. C. Camargo, Dr. Nagaraja C. Mallaiah and Dr. Pardeep Singh** for their support, suggestions and discussions.

My hearty thanks to **Dr. Vipul Sharma (VS), Dr. Kumbam Lingeshwar Reddy (KLR), Dr. Ashish Bahuguna (AB) and Dr. Suneel Kumar (SK)** for their guidance and help at each

and every step of my initial period at IIT Mandi. I will forever be thankful for the support and care they had vested on me throughout the period of my research work. I specially thank to my group members **Ashish (AKB), Priyanka (PC), Hushan (HC), Manisha (MS), Tripti (TC) and Harpreet (HK)** for their research related help and friendly behavior during this entire journey. I will always remember all interesting scientific and non-scientific discussions we had together. I am also thankful to M.Sc. students of our group, **Kamlesh, Abhishek, Satish, Palak and Sameer** for their support. There are countless number of persons whom I want to acknowledge, but writing all the names here would not be possible, hence I would like to thanks all other IIT Mandi friends for their continuous support and encouragement.

I would like to acknowledge the memorable and invaluable company of my friends; **Arjun Barwal, Rohit Rana, Kuldeep Kumar, Arjun Sharma** and **Rajesh Sharma** for their continuous motivation and emotional support which made me to progress persistently.

I would like to deeply express my warm words of gratitude to my ever-loving parents, **Sh. Sher Singh** and **Smt. Sarojini**, my wife **Karuna Thakur**, my sister **Vartika Rana** and brother-in-law **Tek Singh Rana** for their continuous inspiration, motivation and cooperation. I would also like to convey my profound affection to my nephew and niece, **Shaurya Rana** and **Aayushi Rana** whose cute smile always makes me happy and cheerful. In addition, I would like to express my due acknowledgement to my first chemistry teacher **Sh. Rajender Thakur** (Govt. Boys Sr. Sec. School, Solan, HP) who has been a motivation for me to pursue a career in chemistry.

Last but not least, I would like to express my whole hearted gratitude for **Ministry of Education (MoE)**, India for awarding the junior research fellowship (JRF) and senior research fellowship (SRF) to successfully complete my Ph.D.

I am highly grateful to the **Goddess Gayatri**, for her abundant blessings, which lead me in right direction always. My hearty thanks to one and all.

Abbreviations

BET.....	Brunauer-Emmett-Teller
BQ.....	Benzoquinone
CFX.....	Ciprofloxacin
DRS.....	Diffuse reflectance spectroscopy
EDAX.....	Energy-dispersive X-ray analysis
FESEM.....	Field emission scanning electron microscopy
FTIR.....	Fourier-transform infrared spectroscopy
GCN.....	Graphitic Carbon Nitride
GO.....	Graphene oxide
HRMS.....	High resolution mass spectrometry
HRTEM.....	High resolution transmission electron microscopy
ITO.....	Indium doped tin-oxide
MB.....	Methylene blue
NIR.....	Near Infrared
NMR.....	Nuclear Magnetic Resonance
NP.....	Nanoparticles
NR.....	Nanorods
NS.....	Nanosheets
NST.....	Nanostars
PEC.....	Photoelectrochemical cell
PTFE.....	Polytetrafluoroethylene
RGO.....	Reduced graphene oxide
TC.....	Tetracycline
TEA.....	Triethanolamine
TGA.....	Thermogravimetric analysis
TOC.....	Total organic carbon
UCNP.....	Upconversion Nanoparticles
UV.....	Ultraviolet
XRD.....	X-ray diffraction
XPS.....	X-ray photoelectron spectroscopy

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