

CHAPTER 57

TECHNOLOGY
APPLIED SCIENCES AND HUMANITIES

Doctoral Theses

01. DESHWAL (Pankaj)
Customer Service Experience: A Study of Determinants and Consequences in Selected Services
Supervisors: Dr. Prasanta Kumar Bhuyan and Dr. Hamendra Dangri
Th 23596

Abstract
(Not Verified)

The objectives of this research are: (1) To study and understand existing dimensions and consequences of customer service experience in various services areas. (2) To find out gaps in existing customer experience literature (3) To propose new customer service experience models (4) To test and validate customer service experience models in service areas. In Study- I, a cross-sectional research design was laid down. Respondents responses were obtained on the Five-point Likert scale (1 = strongly disagree to 5 = strongly agree) using mall-intercept (hospital-intercept) method. The best cancer hospitals of Delhi and NCR of Delhi were chosen from 'THE WEEK-Nielsen best hospitals survey 2013' for data collection. Exploratory factor analysis, CFA, and structural modeling were considered to validate and to test model fit. In the Study- II, participants were selected from among the retail store customers. An instrument was distributed to retail store customers. Finally, the analysis was run on 346 responses. The data were taken from Big Bazaar and Vishal Mega mart retail stores customers situated in the New Delhi. The researcher followed five-point Likert scale to collect data. ANOVA, EFA, and linear regression were used to obtain results. The analysis was run using SPSS 20.0 software. In study-I, results revealed that cancer patient service experience is described by five constructs – service environment experience, emotive experience, behavioral experience, comfort experience, and social experience, which shows its multidimensionality All dimensions of customer experience influences customer satisfaction. In Study-II, the outputs of this research scientifically reveal the significant difference among some demographic variable categories on the dimensions of customer experience in the Indian retail stores' context. All the dimensions of EXQ influence customer satisfaction. Study-I is useful for academician, marketing practitioner, and hospital administrators. Study-II is useful for retail store owners, marketers, and academicians.

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1. Introduction 2. Review of literature 3. Methodology 4. Data analysis and results 5. Conclusion and scope for future research. References and annexure
02. JOON (Shikha)
Identification and Characterization of a Novel GTP-Sensing Protein Cody in Bacillus anthracis.
Supervisors: Dr. Sonika Bhatnagar, Prof. Rakesh Bhatnagar
Th 23600

Abstract
(Verified)

CodY is a multifaceted transcriptional regulator that participates in a spectrum of cellular activities ranging from metabolism to amino acid biosynthesis and transport, nitrogen assimilation, motility, biofilm formation, sporulation, and virulence in the bacteria whose genome has a low G+C content. *Bacillus anthracis* harbors approximately 500 genes that are targeted by CodY. Its regulatory function is also extended to AtxA, a master regulator protein that affects the expression of virulence genes in *B. anthracis*. The sequence alignment of *baCodY* exhibited putative GTP-binding motifs. Evidently, His⁻CodY protein could interact with GTP with no significant deviation in the mutant versions of the protein in a UV-crosslinking assay. Sequence/structure study of *baCodY* displayed the presence of conserved putative GTP-binding residues which did not overlap with the previously identified motifs. Further, the autophosphorylation activity observed in His⁻CodY protein was completely missing in the His⁻CodYS215A mutant protein validating S²¹⁵ as the critical phosphorylated residue. It might present an additional regulatory mechanism of CodY activity. Thin-Layer Chromatography and coupled-enzyme assay showed a weak GTP hydrolyzing activity in the protein. Our study contributes to the current understanding of the structure-function relationship of this pleiotropic repressor protein.

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1. Introduction 2. Review of Literature 3. Material and methods 4. Results 5. Discussion 6. Summary and conclusion 7. Future prospects. References, appendix and list of publications.

03. MANOCHA (Garima)
A Study on Certain Classes of Entire Functions Represented by Dirichlet Series in One Variable
 Supervisor: Dr. Niraj Kumar
Th 23703

Abstract
(Not Verified)

The present thesis deals with the algebraic, functional and topological structures of the elements of several classes of entire functions represented by Dirichlet series. It is mainly organized into two sections. In the initial part of the thesis, certain classes of Entire Dirichlet series with different norms have been considered whose coefficients belong to either a commutative Banach Algebra with identity or the set of complex numbers. Some remarkable results such as commutative Banach Algebra with identity, Division Algebra, Spectrum and summability on a set of Entire functions represented by Dirichlet series have been proved. Also conditions for the existence of inverse, topological zero divisor and continuous linear functional have been established. Furthermore, a set of entire Dirichlet series is also shown to be a complex FKspace and a Frechet space. In the later part of the thesis, the set of all entire functions represented by Dirichlet series with coefficients in the set of complex numbers is proved to be a Gamma-Ring. A study of commutativity condition and equivalence among primitivity, primeness and simplicity etc. has been made for this set. Also certain results have been established on the socles and prime one-sided ideals of this Gamma-Ring.

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1. Introduction 2. On a class of entire functions represented by dirichlet series 3. A class of entire dirichlet series as an FK-space and a Frechet space 4. Some results on spectrum,, summability and quasi-inverse for a class of entire dirichlet series 5. A study on equivalence among primitivity, primeness and simplicity of enire dirichlet

series as a gamma ring 6. A study on prime one-sided idelas, socles of entire dirichlet series as a gamma ring. Bibliography

- 04 SHARMA (Darshan)
Studies on Nano-Structures Materials for Solar Energy Conversion.
 Supervisor: Prof. Ranjana Jha
Th 23598

Abstract
 (Not Verified)

Quantum dot sensitized solar cells (QDSSCs) are the vital future technological solution for energy demand. The highest efficiency (theoretically calculated) can be achieved up to 44.7% in case of QDSSCs. But, it still has challenges to be resolved for fabrication of the efficient and stable device. Photoanode is an important component like QD sensitizing layer or counter electrode which can affect photocurrent response and net photoconversion efficiency of QDSSC. Thus, a suitable material selection and material engineering related to photoanode are required for optimization of the overall performance of QDSSC. Doping at wide bandgap semiconductor is required to study at much deeper level. More research is required to understand the role of new and existing dopants in ZnO DMSs for application in QDSSCs. Optical properties of co-doped ZnO nanocrystals are still less addressed which limit its application in solar cells, especially in QDSSCs. For application in QDSSCs, tuning of optical properties is much required. In addition, structural and morphological characteristics are important parameters for device applications. In the thesis research work, structural, morphological, optical properties and magnetic behavior of ZnO and TMs doped ZnO nanocrystals have been examined. Much effort has been put to prepare TM-doped WBG DMS ZnO nanocrystals for their application in quantum dot sensitized solar cells. Research work presented in the thesis provides deep insight on pure ZnO and TMs doped ZnO nanomaterials and their application in QDSSCs.

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1. Introduction 2. Synthesis and characterization techniques 3. Structural and optical properties of co-doped ZnO nano-ampoules synthesized by co-precipitation method: Application in quantum dot sensitized solar cell 4. Analysis of structural , optical and magnetic properties of Fe/Co co-doped Zno nanocrystals:Application in quantum dot sensitized solar cell 5. Transition metal (Co, Mn) co-doped ZnO nanoparticles: Effect on structural, optical properties and allocation in quantum dot sensitized solar cell 6. Structural, optical and magnetic properties of Sol-gel derived Co/Mn co-doped ZnO nanocrystals: Application in quantum dot sensitized solar cell 7. Conclusions and future perspectives. Bibliography and list of publications.

05. SHARMA (Nandini)
Studies of Structural and Optical Properties of Zinc Oxide and Tin Oxide Nanostructures and Thin Films for Solar Energy Conversion.
 Supervisor: Prof. Ranjana Jha
Th 23597

Abstract
 (Verified)

A brief background about zinc oxide and tin oxide nanostructures and their synthesis routes have been described. Various synthesis routes such as green sonochemical route, co-precipitation route, hydrothermal route have been utilized for the growth of nanostructures(nanoflowers, quantum dots, nanohexagons, nanowires, nanorods, edge cut hexagons). This thesis is concentrated on the optimization of various synthesis routes

and optical, structural properties of ZnO and SnO. The role of nanotechnology in field of photocatalysis is presented and related current issues have been pointed out. The method of deposition of thin films using solution processing method is also explained. The preparation of zinc oxide nanostructures in different solvents have been discussed. The role of solvent in deciding the particle shape, size and quality of agglomeration has also been explained experimentally. Impact of varied solvent, time and temperature on the structural and optical properties of the samples are found to have significant effect on structural and optical characteristics. The main bottlenecks for low photonic efficiency and various concepts is explained. The effect of various parameters such as concentration of the precursors, growth time in autoclave and ultrasonic wave treatment on the structure, grain size and optical band gap have been investigated and presented. This work provides important scientific information for solar energy conversion about the effect of reaction parameters such as molarity, autoclave duration for heating, different solvents for growth on the structural and optical characteristics of the synthesized nanomaterials. It also opens up new possibilities in the field by providing a detailed information about role of varied reaction process parameters onto the morphology and optical band gap of solar energy materi

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1. Introduction 2. Various synthesis routes and characterization techniques 3. characterization of structural and optical properties of microstructures and nanostructures of Zinc Oxide synthesized by hydrothermal process 4. Study of structural and optical properties of monodispersed zinc oxide nanoparticles synthesized by sonochemical green route 5. Study on photocatalyst zinc oxide annealed at different temperatures for photogradation of Eosin Y Dye 6. Growth of size-controllable tetragonal rutile stannic oxide nanostructures by co-precipitation and hydrothermal route for eosin Y dye degradation under solar radiation 7. Photocatalytic activity of Zinc Oxide thin film nanostructures under solar radiation: enhancement in interfacial charge carrier dynamics 8. Summary and future scope of the research work. Appendices

- 06 TIWARY (Meenakshi)
Development and Characterization of Microbial Consortium for Bioremediation of Pesticide in Bioreactor.
 Supervisor: Prof. Ashok K. Dubey
Th 23599

Abstract (Verified)

Today pesticides are one of the main problems for environment and health. The remediation of these pesticides is necessary for the sustainable development. Bioremediation of pesticides is an alternative to physio-chemical remediation because of its natural and aesthetic appeal. The present study has been done to develop the bioremediation tool for degradation of pesticide by micro-organisms. Actinobacterial strains were isolated from the pesticide contaminated soil samples. Four isolates showed chlorpyrifos degradation and other four showed cypermethrin degradation. The Strains, ADMT11 showed 90 % cypermethrin degradation and ADMT8 showed 70 % chlorpyrifos degradation, at 100 ppm concentrations in five days of incubation. The bacterial strains AKD1 showed 86 % of cypermethrin degradation in seven days of incubation. The degradation rate of cypermethrin and chlorpyrifos did not change significantly in the presence of ADMT11 and ADMT8 respectively, till 150 ppm of initial pesticide concentration. The 16S rRNA gene sequencing identified both the strains as species of genus *Streptomyces*. The strain AKD1 was identified as *Bacillus* sp. The pesticide degradation pathway was also elucidated. ADMT 11

showed 3-Phenoxy benzoic acid as main byproduct. ADMT 8 showed 3,5,6-trichloro-2-pyridinol as main intermediate of chlorpyrifos. The gene responsible for cypermethrin degradation by ADMT11 was also screened and identified. The possible structure of gene showed presence of NADB domain. ADMT8 degraded chlorpyrifos in presence of heavy metals, chromium (1 mM), lithium (40 mM) and lead (4 mM). The chlorpyrifos degradation by ADMT8 and cypermethrin degradation by ADMT11 was enhanced by, 90 % to 95 % and 70 % to 85 % respectively in presence of biosurfactant at 200 mg/L concentration. The bacterial community was observed by metagenomic analysis at pesticide contaminated soil sample using next generation sequencing and analysis. The pesticide affected the microbial community at every level of taxonomic classification.

Contents

1. Introduction and objectives 2. Review of literature 3. Materials and methods 4. Results 5. Discussion 6. Conclusion 7. Bibliography. Appendices