

ANNUAL REPORT-SSCSSN (Jul-16 to Dec-17)

1. The Academic Activities

❖ Research Guidance to Ph.D. Students

1. Ag-Nanoparticle Loaded anti-microbial wound healing Patches; Krutagn Patel, Thesis submitted
2. Micellar Dynamics and Nanostructured Drug Delivery; Vidhi Shah, CSIR-SRF, in progress
3. Value added chemicals from glycerol; Amit Parekh, in progress
4. Conversion of 1,2,3-trichlorobenzene into various useful chemicals by means of different reactions; Ankita Ravani (in association with Dr. Manish Mishra, SP University), in progress
5. Investigation of friction and wear for sliding contacts for metal pairs under various tribological parameters with nano-fluid; Kavita Shah, in progress
6. Synthesis and surface modification of metal oxide nanostructures for various applications; Krupali, in progress
7. Synthesis of Multifunctional Catalysts for Hydrogen Transfer Reactions; Naresh Vala (in association with Dept. of Chem. Eng.), in progress
8. Studies of Micellar catalyzed promotion of organic reactions in water; Reenu Abraham, MANF fellow, (in association with Dept. of Chem. Eng.), in progress
9. Design and development of Drug Delivery System Based on Supersaturation for the Treatment of Osteoarthritis; Deepika Chavda, in progress
10. Exploitation of Photocatalyst for Degradation of Pollutants in Solar Photocatalytic Reactor; Kiran Varma, in progress (in collaboration with, Dr. Vimal Gandhi, Dept of Chem Eng. DDU)
11. Designing Nanofluids as lubricant for enhanced tribological performance: Role of nanoparticle size, shape and surface functionalization ; Ajay Kumar (Apar Industries, Mumbai), in progress
12. Investigation of e-beam irradiation on optical and electrical properties of doped titania nanoparticles; Chirag Patel, in progress
13. Preparation of hybrid Perovskite – CNT materials for Photo-assisted Applications; Sharmin Tinwala, in progress

❖ Research Guidance for projects to M.Tech/M. Pharm/M.D.S. students

Reducing Swelling and shrinkage characteristics of bentonite clay by using different chemical additives; Harshit Pandya (M.Tech, Civil), 2016-17, submitted

❖ Short term training Projects:

1. Meet Mehta (Amity University): Synthesis of Metal oxide Nanoparticles and their Characterization
2. Shirraj (GSET, VVNagar): Metal Doped Titania for visible light photodegradation

3. Priyanka(GSET, VVNagar): Stable suspension of Nanoparticles in Transformer oil for enhanced thermal properties
4. Apoorva(GSET, VVNagar): Nanoparticle/Polymer nanocomposites for insulating applications in electrical components
5. Yash Pathak (BTech, DDU) : Synthesis And Characterization Of Carbon Nanospheres Using Interface Trapping Method

2. The R & D Activities

❖ Ongoing Projects (Govt. and Industrial funded)

Sr. No.	Project Title	Name of Sponsor	Duration	PI/CO-PI	Fund
1	Synthesis, characterization and application of novel green corrosion inhibitors	UGC	3 yrs	Dr. Atindra Shukla	14.0 Lacs
2	Synthesis and characterization of surfactant micelles in ionic liquid and application in catalysis	UGC	3 yrs	Dr. Bhavesh Bharatiya	8.5 Lacs
3	Development of multifunctional catalysts for alcohol activation	UGC	3 yrs	Dr. Manish Mishra	10.9 Lacs
4	Development of efficient micellar media for green catalytic organic reactions	GUJCOST	2 Yrs	Dr. Manish Mishra	4.0 Lacs
5	Synthesis and characterization of garlic acid derivatives and evaluation of anti-aging properties.	GUJCOST	2 Yrs	Dr. Atindra Shukla	4.2 Lacs
6	Evaluation of Physicochemical Properties of Oil Well Drilling Chemicals	C1 Water Systems	1 Yr.	Dr. Bhavesh Bharatiya	5.5 Lacs
7	Designing a reflecting light microscope for 3D imaging of thick and irregular surfaces	DST-TSG	3 yrs.	Dr. Atindra Shukla	79.0 Lacs
8	Surface Modification of Kaolin for Value addition	Shree Ram Minerals	1 yrs.	Dr. Sandip Bhatt	6.0 Lacs

❖ Completed Projects (Govt. and Industrial funded)

Sr. No.	Project Title	Name of Sponsor	Duration	PI/CO-PI	Fund
1	Dynamic surface tension of surfactant and polymer solution in relation to stability and rheology of solid liquid dispersion	DST – FAST TRACK	3 yrs	Dr. Bhavesh Bharatiya	24.0 Lacs

2	Enhanced Oil Recovery using nanomaterials	IRS-ONGC	2 yrs	Dr. Atindra Shukla/ Dr. Manish Mishra	39.3 Lacs
3	Conversion of 1,2,3-trichlorobenzene into valuable chemicals	Kutch chemicals	3 yrs.	Dr. Manish Mishra/ Dr. Atindra Shukla	6.5 Lacs

❖ **Proposal of the projects to be submitted (Govt. and Industrial funded)**

Sr. No.	Project Title	Funding Source	Research Staff	PI/Co-PI	Approx cost
1	Retardation of Evaporation of water from Soil	DST-Water Mission	01-RF 01- RA	Dr. Atindra Shukla	50 Lac
2	Stimuli responsive nano theranostics for Cancer treatment (Submitted)	CEFIPRA	02-RA 02-RF	Dr. Atindra Shukla Dr. Sabrina Belbekhouche (France)	120 Lacs
3	E-beam irradiation on doped semiconductor materials: characterization & application	BRNS	01-RF	Dr. Atindra Shukla & Mukesh Ranjan (IPR)	30 Lacs
4	Friction & wear of various material pairs lubricated with magnetic fluid under various tribological parameters (submitted)	GUJCOST	01-RF	Dr. Atindra Shukla	5 Lacs
5	Exploitation of Photocatalyst for Degradation of Pollutants in Photocatalytic Reactor using Solar Energy and Light Emitting Diodes Irradiation (submitted)	GPCB	01-RF	Dr. Vimal Gandhi Dr. Atindra Shukla	8.2 Lacs
6	Ionic Liquids based on Biodegradable cationic Structures for controlled drug delivery application	BRNS	01-RA	Dr. Bhavesh Bharatiya Dr. P. A. Hasan (BARC)	25.0 Lacs

❖ **Exploratory Projects at SSCSSN:**

1. Graphene Nanospheres for Electrode application
2. Carbon Nanodots synthesis from bio-sources
3. Stable dispersion of Teflon in different oil media (Oils : castor oil, cotton seed oil, sesame oil, dodecanol, engine oil (from two different marketed grade), Paraffinic oil and naphthalene base oil)
4. Magnetic Nanofluids and their lubricity testing
5. Deep Eutectic solvent as micellar media: Application in Catalysis
6. Metal oxide nanoparticles for Enhanced cooling application in Refrigerants (with dept of mechanical eng. , DDU)

- ❖ Other than the research activity, sample analysis done for more than 2200 samples from DDU- faculty of Pharmacy, DDU- faculty of Dental, other departments of DDU.

3. The MOU & Collaborations initiated

- ❖ **MOU**

1. Shree Ram Minerals
2. PDPU (in process)
3. Avarya Cosmetics (in process)

4. The funds generated and the revenue generated

- ❖ **Revenue Generated**

1. 31,05, 267/- (Industry & Govt. funded projects)
2. 4,03,874/- (Sample Analysis)
3. 8,00,000/- (IFM and IAB contribution)
4. 40,000/- (Training Fee)

5. Research Papers, Conference Papers and Seminars by the center and members of the center

- ❖ **Research Papers**

1. Quality by Design approach for an in situ gelling microemulsion of Lorazepam via intranasal route, Vidhi Shah, Mukesh Sharma, Radhika Pandya, Rajesh K Parikh, Bhavesh Bharatiya, Atindra Shukla*, Hsieh-Chih Tsai*, **Materials Science and Engineering C: (2017), 75, 1231-1241**
2. Cationic surfactants modulate aqueous micellization and wetting on PTFE by Triton X-100: Effect of alkyl chainlength, headgroup and counterion K Thakkar, B Bharatiya, D Ray, VK Aswal, P **Journal of Molecular Liquids, (2017), 241, 136-141**
3. Influence of Chemical Additives on Shrinkage and Swelling Characteristics of Bentonite Clay, M.V. Shah*, H.J. Pandya, A.D. Shukla; **Procedia Engineering, (2017), 189, 932-937**
4. Adsorption of nonionic Brij and Tween surfactants at PTFE-water and air-water interface: Investigations on wetting, dispersion stability, foaming and drug solubilisation. Vidhi Shah; Bhavesh Bharatiya*; Atindra D Shukla; Dinesh O Shah; Tulsi Mukherjee, **Colloids and Surfaces A: Physicochemical and Engineering Aspects (2016), 508, 159-166**
5. Recent advances in hybrid solar cells based on natural dye extracts from Indian plant pigment as sensitizers, Bhogaita, Mehul; Shukla, Atindra D.; Nalini, Pratibha R.*; **Solar Energy, (2016), 137, 212**

6. Shape transition in ABC triblock copolymer micelles complexed with SDS through quaternized polyvinyl pyridine central block, Bhavesh Bharatiya*, Pratap Bahadur, **Colloid and Polymer Science**, (2017), **295**, 1089-1093

7. A multitechnique approach on adsorption, self-assembly and quercetin solubilization by Tetronics® micelles in aqueous solutions modulated by glycine, Sadafara A Pillai, Bhavesh Bharatiya, Matilde Casas, Emilio V Lage, Isabel Sandez-Macho, Haridas Pal, Pratap Bahadur **Colloids and Surfaces B: Biointerfaces** (2016), **148**, 411-421

8. Molecular interactions involving aqueous Triton X-100 micelles and anionic surfactants: Investigations on surface activity and morphological transitions Khushbu Thakkar, Bhavesh Bharatiya, Debes Ray, Vinod K Aswal, Pratap Bahadur **Journal of Molecular Liquids** (2016), **223**, 611-620

❖ Conference Papers/Invited lectures and delivered talks

❖ Oral Presentations

Dr. Atindra Shukla:

- i. Recent advance in Nanotechnology and Application, Dr. Atindra Shukla, Short Term Training Programme (STTP) on Hands on Training on Multiscale Simulation in Advanced Materials Science & Technology (HTMSAMST-2016) at SVNIT, Surat, 14-24 July, 2016
- ii. Energy and Nanotechnology, Dr. Atindra Shukla, Short Term Training Programme (STTP) on Hands on Training on Multiscale Simulation in Advanced Materials Science & Technology (HTMSAMST-2016) at SVNIT, Surat, 14-24 July, 2016
- iii. Experimental investigation on stability of silica nanoparticle dispersions at reservoir condition, Dr. Atindra Shukla, Dr. Sandip Bhatt, 5-8 Dec, 2016, Petrotech-2016, New Delhi
- iv. Hydrophobization of Magnetic Iron-nanoparticles with Single-step Surface Modification, Dr. Atindra Shukla, Krupali Mehta, 6-8 Dec 2017, ICN-3I, IIT Roorkee
- v. Stimuli-Responsive Targeted Drug Delivery: From Therapy to Theranostics, Dr. Atindra Shukla, Keynote Lecture, YSA, 1st Indo-Australian Conference on "Current Trends in Pharmaceutical Technology and Nanoscience, Anurag Pharmacy College, Suryapet, Telangana

❖ Oral/Poster presentations by students:

Oral presentation:

1. Vidhi Shah, Bhavesh Bharatiya, A.D. Shukla, D. O. Shah, Role of typical SDS concentration on stable Ag nanoparticle dispersion, "M4 colloids symposium" by Cardiff University, Cardiff, UK, 26th July, 2107.
2. Vidhi Shah, Bhavesh Bharatiya, A.D. Shukla, D. O. Shah, Diffusion of hydrophilic block copolymers at PTFE-water interface: Effect of concentration and HLB. "National conference of Surfactants and Colloids" by ICT, Mumbai, India, 10-11th February, 2017.

Poster presentation:

1. Nitration of 1,2,3- tri chlorobenzene using homogeneous and heterogeneous catalysts. Ankita Ravani, A.D. Shukla M.K. Mishra, The national seminar on current scenario: opportunities and challenges in chemical science research" 15th March 2017, organized by Dept. of chemistry, S.P.University, Vidhya nagar, Anand.
2. Activity of Cu ions intercalated Mg-Al hydrotelcites in borrowing hydrogen reactions, Naresh Vala, P. A. Joshi, M.K. Mishra, The national seminar on current scenario: opportunities and challenges in chemical science research" 15th March 2017, organized by Dept. of chemistry, S.P. University, Vidhya nagar, Anand.
3. Aggregation of surfactants in eutectic type ionic liquids based on Choline chloride and urea: Surface tension and dynamic light scattering measurement, Sima Solanki, Ankita Ravani, Amit Paekh, A.D. Shukla, Bhavesh Bharatiya, The national seminar on current scenario: opportunities and challenges in chemical science research" 15th March 2017, organized by Dept. of chemistry, S.P. University, Vidhya nagar, Anand.
4. Langmuir-Blodgett monolayers of Gallic Acid derivatives as Corrosion Inhibitor, U .Trivedi, M. Ranjan, A.D. Shukla, ISMC-2016, held at Anushakti Nagar, BARC, Mumbai during December 06-10, 2016.
5. Langmuir-Blodgett Self Assembled Monolayer of Amphiphilic Gallic Acid esters for thin film Coating. U. Trivedi, M. Ranjan, A.D. Shukla, UGC Sponsored National Seminar on Current Scenario: Opportunities and Challenges in Chemical Science Research (COCCS-March 15, 2017)

6. Students Admitted

- ❖ PhD : 7 students (admitted)
- ❖ PhD : 6 students (in progress)