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N. Sarkar, K. Das, D. Nath and K. Bhattacharyya.***Langmuir***, *10*(1994), 326.

**5.** Interaction of urea with fluorophores bound to protein surfaces.

K. Das, N. Sarkar and K. Bhattacharyya.***J. Chem. Soc. Faraday Trans***., *89*(1993), 1959.

**4.** Excited-state intramolecular proton transfer and rotamerism of 2-(2$^{/}$-hydroxy phenyl) benzimidazole**.**

K. Das, N. Sarkar, D. Majumdar and K. Bhattacharyya. ***Chem. Phys. Lett.***, *198*(1992), 443.
Correction: **Chem. Phys. Lett**. 1993, 204(3,4), 393 .

**3.** Non-radiative pathway of anilino-naphthalene sulphonates : twisted intramolecular charge transfer versus intersystem Crossing.

K. Das, N. Sarkar, D. Nath and K. Bhattacharyya. ***SpectrochimicaActa***, *48A*(1992), 1701.

**2.** Interaction of urea with fluorophores bound to cylcodextrins. Fluorescence of p-toluidino naphthalene sulphonate.

N. Sarkar, K. Das, D. Nath and K. Bhattacharyya, ***Chem.Phys. Lett.***, *196*(1992), 491.

**1.** Effect of urea on micelles: Fluorescence of p-toluidino naphthalene sulphonate.

N. Sarkar and K. Bhattacharyya. ***Chem. Phys. Lett.***, *180*(1991), 283.

**According to Scopus (20.02.2018)**

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|---|---|
| Total Citation | 4645 |
| Self Citation | 993 |
| Total Citation excluding Self Citation | 3652 |
| h Index | 36 |
| h Index excluding Self Citation | 31 |
| RG Score | 42.39 |

**13. Sponsored Project(s):**

| **Project Title** | **Funding Agency** | **Period** | **Amount** |
|---|---|---|---|
| Femtosecond Laser Facility to Investigate Confined Media, Biological Assemblies, Room Temperature Ionic Liquids and Nano-Materials | SERB (DST) | 27-03-2015 to 26-03-2020 | 2,46,86,000/- |
| Synthesis, Characterization and Application of Surface Active Ionic Liquids (SAILs) forming Self-assemblies and Investigation of Dynamical Process. | CSIR | 01-10-2014 to 30-09-2017 | 11,16,000/- |
| Characterization of Ionic Liquid containing microheterogeneous media and Investigation of Ultrafast Processes in these confined media | CSIR | 01-02-2011 to 31-01-2014 | 19,67,000/- |
| Synthesis and optical properties of metal nanoparticles in aqueous and non-aqueous reverse micelles and investigation of solvent relaxation in reverse micelles in presence of metal nanoparticles | BRNS | 16-02-2009 to 15-02-2012 | 20,70,200/- |
| Study of ultrafast processes in ionic liquid containing | CSIR | 12-05-2006 to 11-05-2009 | 10,46,000/- |

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| microheterogeneous media | | | |
| Characterization of Micelles, Reverse Micelles in Room temperature ionic liquids (RTILs) using Dynamic Light Scattering, Fluorescence Spectroscopy and use of these novel systems for photophysical, dynamical studies and nanoparticle synthesis | DST | 01-10-2007 to 30-09-2010 | 38,55,000/- |
| Ultrafast Spectroscopic Study of Solvation and Photochemical reactions in solution and organized assemblies | ISIRD | 01-08-1998 to 31-07-2000 | 1,00,000/- |

**14. Thesis Provided by Professor Nilmoni Sarkar :**

| **Name** | **Thesis Title** | **Year** |
|---|---|---|
| Dr.Partha Hazra | Investigation of photo-physical properties of organic molecules with the help of both steady state & time resolved fluorescence spectroscopic techniques. | 2004 |
| Dr.Debdeep Chakrabarty | Study of Excited State Intramolecular Proton Transfer, Solvation dynamics in different organized | 2005 |

| | | |
|---|---|---|
| | Assembly using steady state & time resolved fluorescence spectroscopic techniques | |
| Dr.Anjan Chakraborty | Photophysics of drug molecules and Study of different biological systems by fluorescence spectroscopy | 2006 |
| Dr.Debabrata Seth | Photochemistry and Chemical Dynamics | |
| Dr.RajibPramanik | Dynamics of solvent and rotational relaxation in room temperature ionic liquid containing mixed solvents and microheterogeneous systems. | 2011 |
| Dr.PalashSetua | Nonaqueous reverse micelles as templating media and investigation of solvent relaxation in organized assembly containing nanoparticle | 2011 |
| Dr.Souravi Sarkar | Photophysical and dynamical studies in solvent mixture, room temperature ionic liquids (RTILs) and RTIL containing confined media. | 2012 |
| Dr.ChiranjibGhatak | Fluorescence Spectroscopic Investigation of Various Photophysical and Dynamical Phenomena inside Biologically Relevant | 2012 |

| | | |
|---|---|---|
| | Environment. | |
| Dr. Vishal Govind Rao | Preparation and Characterization of Different Microheterogeneous Systems Containing Ionic Liquids: Investigations of Various Photophysical and Dynamical Phenomena | 2013 |
| Dr.Sarthak Mandal | Excited State Intramolecular Proton Transfer, Energy Transfer and Solvation Dynamics in Biologically Relevant Self-Assemblies, Room Temperature Ionic Liquid and Binary Solutions | 2014 |
| Dr.Chiranjib Banerjee | Photophysics and Dynamics of Different Fluorophores in Confined Media | 2015 |
| Dr.Surajit Ghosh | Dynamics of Solvation, Photoisomerisation and Proton transfer in microheterogenous systems consisting of Surfactants,Polymers and RTILs | 2015 |
| Dr. Jagannath Kuchlyan | Investigation of Various Photophysical and Dynamical Phenomena Using Different | 2017 |

| | | |
|---|---|---|
| | Spectroscopic and Microscopic Techniques. | |
| Dr. Arpita Roy | Morphological Alteration of Various Self-assemblies and Its Effect on Different Excited Sate Processes. | 2017 |
| Dr. Niloy Kundu | Fluorescence Spectroscopy to Unveil different Photophysical Phenomena inside Biologically Relevant Environment: From Ensemble Average to Single Molecule Measurements. | 2017 |
| Dr. Debasis Banik | Investigation of Different Photophysical and Dynamical Processes within Self-Organized Systems and Inhibition Strategies of Fibrillar Assemblies formed by Single Amino Acids. | 2017 |

**15. <u>Work in Progress:</u>**

**1. Single Molecule Spectroscopy. (a)** Amyloid fibrils, highly organized protein or peptide aggregates, are associated with several pathological disorders such as Alzheimer's disease, transmissible spongiform encephalopathy, type II diabetes, and prion disorders. Polyphenols are well known for the disruption of such amyloid flibrils. Using fluorescence correlation spectroscopy (FCS) and fluorescence lifetime imaging microscopy (FLIM) we have examined

the growth of fibre like network of different metabolites such as l-phenylalanine, tyrosine and glycine etc and their disruption using crown ether and lanthanides.

**(b)** Early cell membranes are thought to comprise of fatty acid or other single chain amphiphiles. The most important feature of the fatty acid vesicle is the self replication. Therefore, it has a great relevance to understand the emergence of cellular life in real biological system. We are studying different dynamics and interaction of different fatty acid based vesicles using FCS and FLIM measurements. We have conducted time scan FLIM measurements of the vesicular aggregates to understand the kinetics of vesicle fusion in presence of different external additives such as electrolytes, ionic liquids etc.

**(c)** Self-assembly of amphiphilic molecules is the main driving force for the formation of a wide variety of nanostructures using different building units. FCS is one of the unique way to understand the self assembly of different surfactants including surface active ionic liquid (SAIL). The transition of micelle to vesicle is studied by measuring the diffusion coefficient of differently charged fluorophores.

**(d)** Graphene is now expanding its territory beyond electronic and chemical applications toward biomedical areas such as precise biosensing through graphene-quenched fluorescence, graphene-enhanced cell differentiation and growth etc. Using FCS as a tool we have showed the adsorption of different biomolecules such as protein or protein based fluorescent nano cluster on the grapheme oxide (GO) surface. Further, we have studied the controlled adsorption of different molecules on GO surfaces in presence of non-ionic triblock copolymer and using FLIM we have showed that this assembly can be used for the live cell imaging. The drug loading capacity into the cancerous cell can also be enhanced in presence of GO.

**(e) Multi-wavelength FLIM measurements.** The Multi-wavelength FLIM system can detect the fluorescence simultaneously in 16 wavelength channel. Therefore, the wavelength region can be tuned depending on the situation. The light from one DCS-120 output is focused into the slit plane of the polychromator. The polychromator project a spectrum of the fluorescence light on a 16-channel PMT tube inside a bh PML-16C multichannel detector. PML-16 delivers a timing pulse for every photon. Thus, TCSPC modules ‘routes’ photon of different wavelengths into separate lifetime images and the process does not involve noticeable loss of photons. Different

phophysical phenomena such as solvation dynamics and excited state proton transfer of fluorophores are monitored in a single vesicle using MW FLIM.

**(2) Femtosecond Fluorescence Upconversion.** Usually, small amphiphilic molecules such as dimethyl sulfoxide (DMSO), dioxane, ethanol, 1-propanol, tert-butyl alcohol (TBA), which contain both hydrophilic and lipophilic moieties, have a tendency to form microheterogeneous aggregates upon mixing with water. We have performed picosecond solvation dynamics of different alcohol-water mixtures as well as DMSO-water mixture using femtosecond fluorescence upconversion techniques and we have obtained different anomalous regions in the mixture which is due to the aggregation induced structural transition of alcohol molecules.

**3**. **Time Correlated Single Photon Counting (TCSPC).** Different photophysical phenomena such as excited state proton transfer, fluorescence resonance energy transfer (FRET), electron transfer and solvation dynamics have been studied extensively in different confined systems using TCSPC.