Session I: Functional Colorants

Unique Aggregation-Induced Emission Materials for Sensors,Latent Finger Printing and Optoelectronic Devices

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Prof. Iyer holds an M.Sc. in Organic Chemistry from Bhavnagar University and a Ph.D. in Chemistry from Central Salt & Marine Chemicals Research Institute, Bhavnagar. He did post-doctoral stints during 1999-2001 at Israel Institute of Technology and moved to University of California, Santa Barbara in 2001 as a Du Pont Postgraduate Researcher. He was US Army Associate at Case Western Reserve University in Cleveland during 2003-4. He joined IIT-Guwahati as an Assistant Professor in 2004 and has been a full Professor there since 2013.

Prof. Iyer has done pioneering work in functional colorants mainly in the field of optoelectronics, photovoltaics and organic light emitting diodes. Technologies developed in his laboratories have been transferred to industries such as I & I Tech Limited, Hong Kong; Inchem Technologies, Guwahati; Reliance Industries limited and Optiwave Photonics Ltd., Hyderabad. He has handled research projects worth ~Rs 16 crores so far in IIT-G and is currently pursuing a project of Rs 57 crores.

Prof. Iyer was awarded the INSA Medal for Young Scientist in Chemical Sciences in 2008. He has been selected this year for a Bronze Medal in Chemistry by CRSI. He is on the Editorial Advisory Board in 3 international journals and is an Associate Editor of Nature Scientific Reports since 2015. He has published 153 research papers and has filed 19 patents of which 9 are commercialized. He has guided 21 Ph.D. and 37 Masters students.

Abstract

Organic nanomaterials based fluorescent small molecules and polymers have revolutionized biotechnology and optoelectronics with their multifunctional real-world applications covering the field of bio-imaging, disease diagnosis and biosensors. The principle of aggregation-induced emission (AIE) has been efficiently utilized to design materials that include a series of rare molecules and unconventional polymers for applications ranging from chemical and biological sensors, optoelectronic devices, latent finger printing and responsive materials. By making a careful choice of molecules and strategic design principle, it was possible to achieve unique photophysical properties in a multiple class of materials leading to the development of vital mechanistic aspects in terms of achieving AIE, detection of specific analytes, multiple responsive materials as well as biocompatibility and imaging. Owing to their strong self-assembling nature in water, in crystalline and amorphous forms, materials possessing interesting and active natures for various applications could be developed.

This presentation presents the simple design principles that were utilized to develop a unique class of materials and their remarkable applications.