Oral

3rd Asian Conference on Chemosensors and Imaging Probes (AsianChIP – 2019)

A Molecular rotor based sensor for Heparin

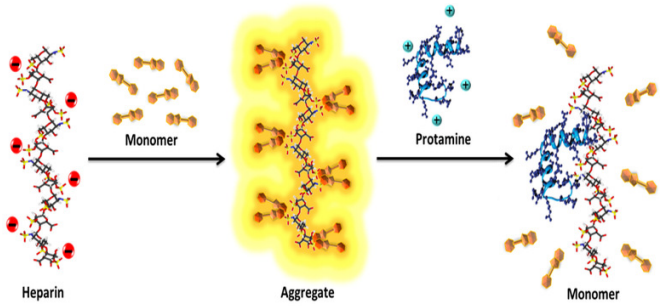
Prabhat K. Singh and Niyati H. Mudliar

Radiation & Photochemistry Division, Bhabha Atomic Research Centre, Mumbai 400 085, INDIA

Email: prabhatk@barc.gov.in; prabhatsingh988@gmail.com

Abstract

Heparin belongs to the family of glycosaminoglycan with a very high degree of sulfation and carries the highest negative charge density known for any bio-macromolecule. Heparin is the second most widely used natural drug, and clinically, Heparin is widely used as an anticoagulant during surgery to prevent thrombosis, and in the treatment of thrombotic diseases. However, Heparin overdose induces certain complications such as hemorrhages, Heparin-induced thrombocytopenia, etc. Thus, it is very essential to monitor the level of Heparin during and after surgery, and control the amount of Heparin for anticoagulant therapy to avoid complications induced by Heparin-overdose. Constructing "turn on" fluorescent probes for Heparin, a most widely used anticoagulant in clinics, from commercially available materials is of great importance, but remains challenging. Here, we report the formation of a rarely observed emissive H-aggregate of an ultrafast molecular rotor dye, Thioflavin-T, in the presence of Heparin, which provides an excellent platform for simple, economic and rapid fluorescence turn-on sensing of Heparin. Our sensor system offers several advantages including, emission in the biologically advantageous red-region, dual sensing i.e., both by fluorimetry and colorimetry, and most importantly constructed from in-expensive commercially available dye molecule, which is expected to impart a large impact on the sensing field of Heparin. Our system displays good performance in complex biological media of serum samples. The novel Thioflavin-T aggregate emission could be also used to probe the interaction of Heparin with its only clinically approved antidote, Protamine.



References: Bromfield, S. M.; Wilde, E.; Smith, D. K. Chem. Soc. Rev. 2013, 42, 9184–9195

Bio-Sketch of the Speaker

Prabhat K. Singh
Assistant Professor
Homi Bhabha National Institute, Mumbai-94
Scientific Officer (F)
Radiation & Photochemistry Division
Bhabha Atomic Research Centre

Member, Indian National Young Academy of Science (INYAS), NewDelhi
Member, The National Academy of Sciences, India, Allahabad
Associate, Indian Academy of Science, Bangalore
Young Associate, Maharashtra Academy of Science, Pune

Prabhat K. Singh is currently working as a Scientist at Radiation and Photochemistry Division of Bhabha Atomic Research Centre, India. He is also an Assistant Professor at Homi Bhabha National Institute, Mumbai, India. His research interests include crafting of self-assembled materials and their applications in designing optical sensors for bio-sensing applications. He is recipient of the Young Scientist Award by Department of Atomic Energy (DAE) as well as by Indian Science Congress Association (ISCA). He has recently been selected as the Member of the India's first Young Academy, i.e., Indian National Young Academy of Sciences (INYAS) under the flagship of INSA, in 2017. He is also selected as Associate of Indian Academy of Science (IASc), Bangalore. Recently, he has been selected for the NASI-Young scientist Platinum Jubilee Award-2017. In 2018, he has been selected as the Young Associate for Maharashtra Academy of Science (MASc.), Allahabad and as the Member of NASI.