

Invited Lecture

Inter-Disciplinary Explorations in Chemistry (I-DEC 2018)

Talented Small Molecules for Varying Cellular Organelles Targets and Sensing

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Abstract:

Recent advancement and development in fluorescence imaging techniques has witnessed tremendous upsurge in the field of metal ion sensing and live cell imaging. Each cellular organelles plays an important role in many physiological activities such as cell migration, cell signalling and cholesterol homeostasis *etc.* Hence, the development of low cytotoxic and high photo stable cellular staining agent as well as selective and sensitive sensor for intracellular detection is an hour of demand.

Recently, we report design and facile synthesis of a multifunctional imine and azine based small molecules such as **L₁**, **L-lyso**, **H₃L** and **ERLp** (Figure 1).¹⁻⁴ **L₁** and its Al(III) complex stain nucleus as well as nucleolus along with sensitive intracellular Al(III) sensing. **L-lyso** exhibits excellent two-photon properties with tracking of lysosomes in live cells as well as in 3D tumor spheroids whereas **H₃L** acts as a highly selective, sensitive and reversible Al³⁺ sensor with a detection limit of 42 nM. Moreover, **ERLp** act as an endoplasmic reticulum tracker, monitoring ER stress and vesicular transport to lysosomes. Furthermore, **L₁**, **L-lyso** and **ERLp** are found to be highly photo-stable. Thus, these trackers has an edge over the commercially available expensive and less stable probes.

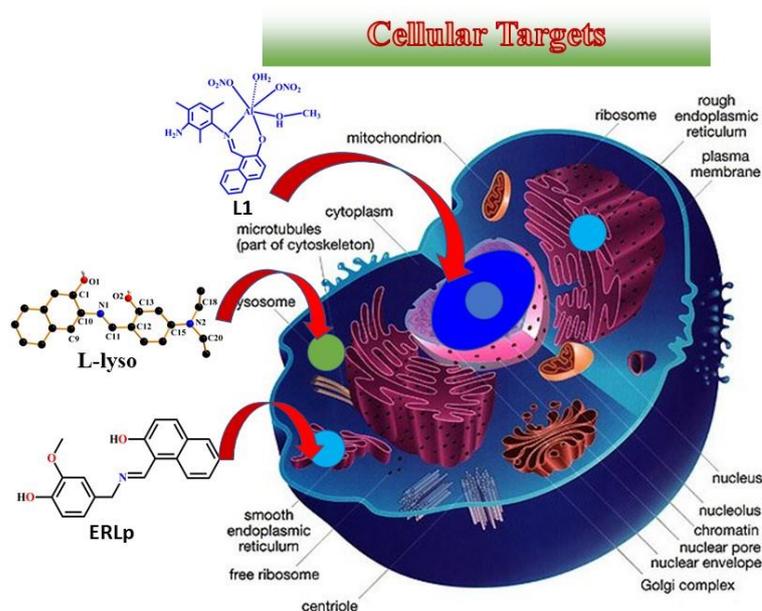


Figure 1: Overview of varying cellular organelles targets.

References and Notes:

1. Saini, A. K., Sharma, V., Mathur, P. and Shaikh, M. M.; *Sci. Rep.*, **2016**, *6*, 34807.
2. Saini, A. K., Natarajan, K. and Shaikh, M. M.; *Chem. Commun.*, **2017**, *53*, 9870.
3. Kumari, P., Verma, S. K., and Shaikh, M. M.; *Chem. Commun.*, **2018**, *54*, 539.
4. Kumari, P., Verma, S. K., and Shaikh, M. M.; *Chem. Commun.*, **2018** (Under Revision).

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Bio-Sketch of Speaker

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Dr. Shaikh accomplished his Bachelor's and Master's from Wilson College, University of Mumbai with major in Chemistry and PhD from Mumbai University in Chemistry. In 2012, he joined IIT Indore and now working as an Associate Professor in Discipline of Chemistry.

He had developed his research group working in wide area of research including Optical and electrochemical sensing, Single-Crystal-to-Single-Crystal (SCSC) Transformation, MOFs based Supercapacitors for energy storage, metal nano-oxide materials derived by employing metal complexes as single-source molecular precursors as catalyst in organic transformation and greener c-dots. Moreover, the research group designs and synthesizes small molecules as cellular organelles target, cell imaging and docking.

Achievements:

- Dr. Shaikh has been listed amongst highly prolific authors by *Current Science*, (*CURRENT SCIENCE, VOL. 109, NO. 5, 10 SEPTEMBER 2015*) rivalling researchers from prestigious institutions such as CSIR-IICT, CSIR-NCL and IIT Kharagpur.
- Recognised among top 10 researchers in Chemistry in India by *Careers 360* (Most Outstanding Researcher Award, 2018) with a *h*-index of 44, more than 385 publications and ~7400 citations to date.
- Research work on novel dye for tracking lysosomes in live cell imaging covered by *Free Press Journal* Indore edition (April 14, 2018).