A single benzene fluorescent probe for efficient formaldehyde sensing in living cells using glutathione as an amplifier

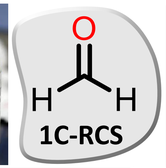
Anal Jana & Animesh Samanta*

Molecular Sensors and Therapeutics Research Laboratory, Dept. of Chemistry, School of Natural Sciences, Shiv Nadar University, NH 91, Tehsil Dadri, Gautam Buddha Nagar, Uttar Pradesh, India 201314

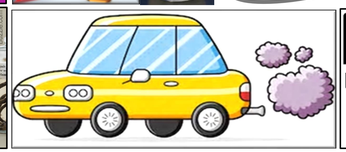
* Email : animesh.samanta@snu.edu.in

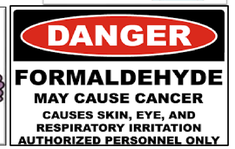
Introduction

Exogenous Sources

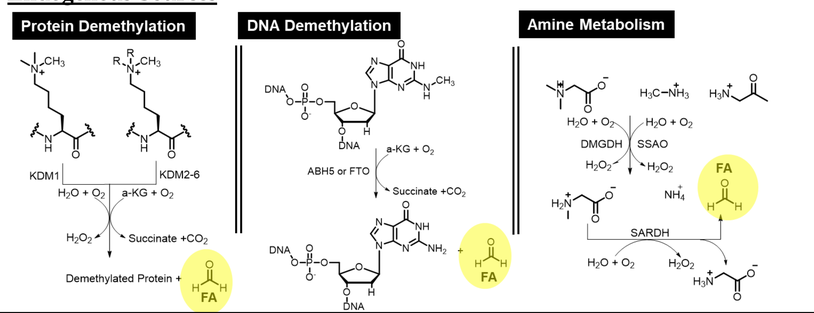


20 million tons/year formaldehyde production





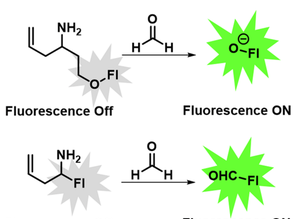
Endogenous Sources

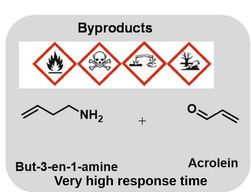


Existing Strategies

- HPLC and LC-MS based derivatization techniques for detection of FA. However, economic viability, sample preparation, low s/n ratio and ease of access limits its use in regular life.
- Fluorescence based detection technology due to non-invasive, cost-effective, high s/n ratio.

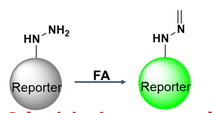
Aza-Cope rearrangement based strategies



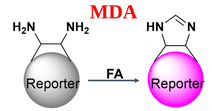


Disadvantages of aza-Cope based techniques

Other reaction based strategies



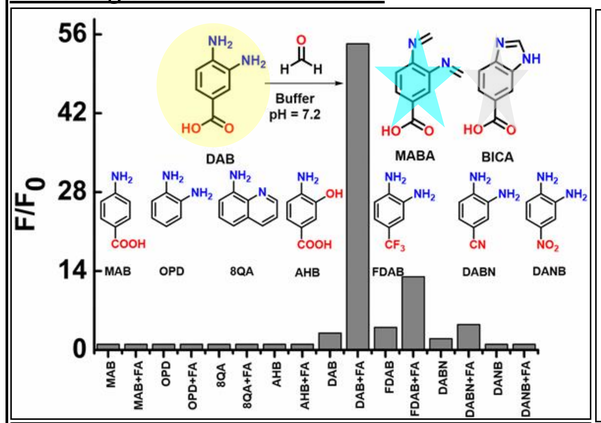
Selectivity issues towards MDA



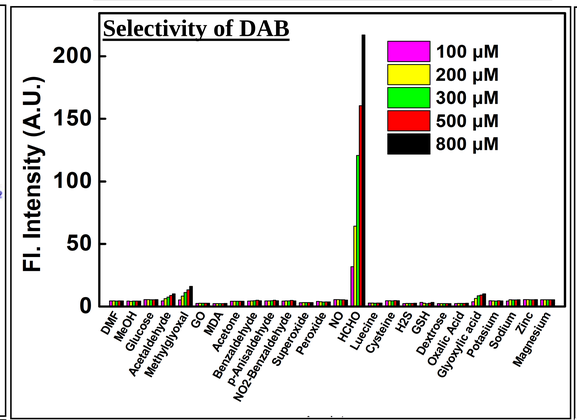
More selective towards FA

Results and Discussions

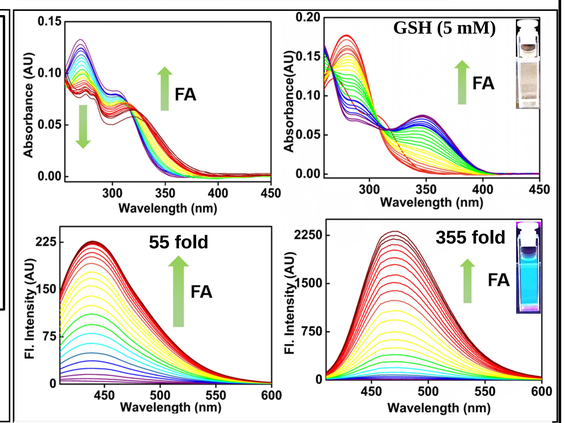
Screening of the amine molecules



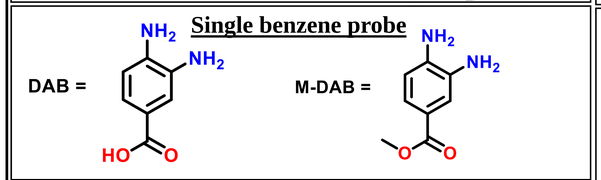
Selectivity of DAB



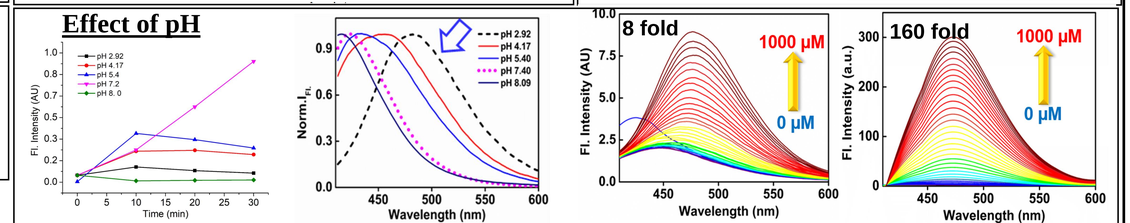
FA sensing by using DAB and M-DAB



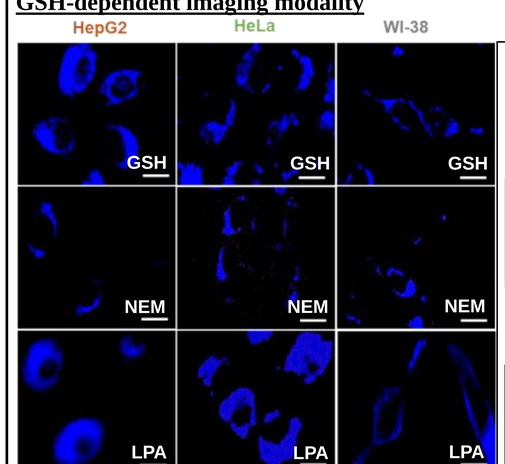
Single benzene probe



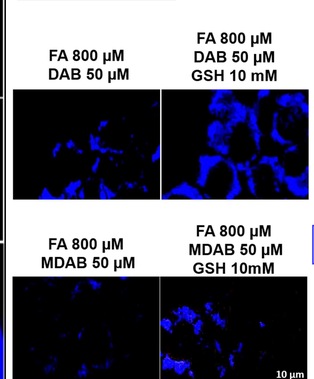
Effect of pH



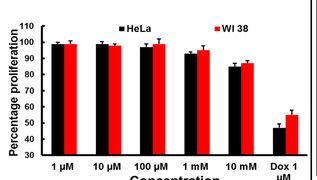
GSH-dependent imaging modality

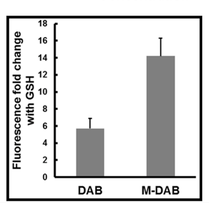


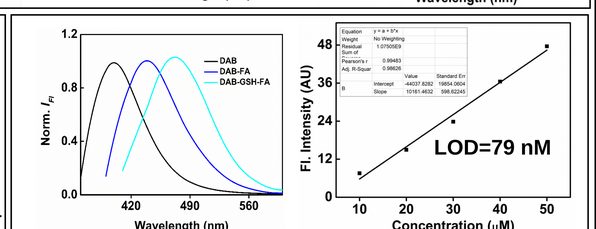
Effect of GSH



Cytotoxicity of DAB







Conclusions

- 3,4 diamino benzoic acid (DAB) can be efficiently used as a selective formaldehyde sensor.
- Application of the probe to detect exogeneous as well as endogenous FA in the live cell imaging, i.e. in presence of GSH the efficiency of this probe is more.

Acknowledgements: DST-SERB, Govt. of India, Shiv Nadar University and Shiv Nadar Foundation, India.