# UniSysCat - Colloquium

Prof. Tharamani C. Nagaiah

*Department of Chemistry, Indian Intitute of Technology, Ropar*

Start Time: Wednesday, July 27, 2022 05:00 pm

End Time: Wednesday, July 27, 2022 06:00 pm

## Conversion of industrial waste $H_2S$ pollutant to value-added products

*Prof. Tharamani C. Nagaiah*

*Department of Chemistry, Indian Intitute of Technology, Ropar*

Highly efficient and cost-effective hydrogen production (H2) promises to play a vital role in green energy production due to its high energy density, low-pollution, and renewable nature. The electrocatalytic decomposition of H2O to H2 and O2 considered to be the most sustainable method for pure H2 production, unfortunately, it stumbles due to potentially uphill and energyconsuming sluggish anodic oxygen evolution reaction (OER).1 Contrary to H2O isostructural hydrogen sulfide (H2S) possesses lower bond dissociation energy. Therefore, anodic sulfide oxidation reaction (SOR) will be more energy-efficient than OER. Presently, the Claus process is the most popular industrial technology for removing H2S, but energy wasted in the form of steam. Therefore, electrochemical conversion of environment pollutant H2S into H2 and S provide a way to remove pollutant H2S and also emerges as new energy source.2 However, the industrialization of such energy-efficient technology never meets the expectation in reality in the absence of cost-effective and robust electrocatalyst. Herein we have designed CoFeS2 based catalyst that exhibited lower onset potential of 0.23 V vs. RHE towards SOR, which is 1.25 V lower than OER. Notably, only a 1.2 V commercial battery easily derives H2S electrolysis, which is impossible for H2O splitting demonstrating the tremendous future prospective of H2S for cheaper hydrogen production for a sustainable economy.

References:

1. Zhang, M.; Guan, J.; Tu, Y.; Chen, S.; Wang, Y.; Wang, S.; Yu, L.; Ma, C.; Deng, D.; Bao, X., Highly efficient H 2 production from H 2 S via a robust graphene-encapsulated metal catalyst. Energy Environ. Sci. 2020, 13 (1), 119-126. 2. Kumar, M.; Tharamani, C. Nagaiah, Journal of Materials Chemistry A, 2022, 10, 7048 - 7057

Prof. Prashanth Wilfried Menezes

Organizer