High purity Hydrogen production using Sorption enhanced steam methane reforming (SESMR)

Anvith Reddy Singireddy*
* Dr M. Mukunda Vani
Chaitanya Bharathi institute of Technology, Gandipet, Hyderabad, Telangana
mukundavanim_chem@cbit.ac.in

Steam Methane Reforming (SMR), the workhorse of hydrogen production, faces hurdles in high energy consumption and CO2 emissions. Sorption Enhanced Steam Methane Reforming (SESMR) offers a compelling alternative, utilizing the magic of solid sorbents to overcome these limitations.

Born in the late 90s, SESMR boasts significant advantages over SMR. With significantly lower operating temperatures, its selectivity yields exceptionally pure hydrogen (reaching 96% in early tests). Additionally, co-immobilization of sorbents allows for in-situ CO2 capture, minimizing emissions. Advanced dual-functional catalysts further boost efficiency by synergistically combining methane conversion and carbon dioxide removal.

We employ glass chromatography to meticulously verify the high purity of the produced hydrogen. In-depth technoeconomic and life cycle analyses will be conducted to assess the economic feasibility and environmental impact of this process at scale.

The future of high-purity hydrogen production shines brightly with SESMR. This technology paves the way for a sustainable and efficient future, powering clean energy applications of tomorrow.

Keywords: Sorption enhanced steam methane reforming, dual functional catalysts, carbon capture, Efficiency.