

Symposium Title (Symposium #): **Hydrogen-Materials Interactions: Activation, Storage, and Utilization from Molecules to Bulk (#299)**

Topic Area: Materials

Description/Focus and Content

Materials and technologies for efficient utilization of hydrogen constitute paramount requirement for the replacement for hydrocarbons as a transportation fuel and significant energy reduction in industrial processes. However, existing strategies for active utilization of hydrogen have been individually developed in various fields, i.e., molecular/nanoparticle/solid or homogeneous/heterogeneous system. Fundamental breakthrough discoveries in materials science will be required to achieve safe, economical, recyclable energy transformation and efficient material conversion and realized by calling upon a great amount of expertise for materials-hydrogen interaction over a wide dimension of materials.

The main scope of our session is to achieve fundamental understanding of the chemical and structural interactions governing hydrogen activation, storage and utilization in a wide spectrum of candidate materials from molecules to solids. In particular, we pay attention to the studies of the effect of scaffolding, nanosizing, polarizing of the candidate materials on their activation and dynamics properties. The attendees will have the opportunity to learn about the current progress, challenges and practical aspects of the hydrogen economy.

The session Hydrogen-Materials Interactions will broadly address H₂ utilization in molecules/materials that span length-scales from atomic to bulk. Topics include:

- *Dihydrogen coordination complexes and metal hydrides for green catalytic applications
- *Hydrogen interactions in nanoporous materials such as Metal-Organic Frameworks (MOFs)
- *Liquid organic hydrogen carrier and catalytic hydrogenation/dehydrogenation for high capacity hydrogen storage
- *Earth abundant catalysts for H₂O splitting and H₂ production
- *Solar energy conversion based on proton-coupled electron transfer for the reduction of protons to H₂
- *Functional oxides and polyoxometalates (POMs) for efficient utilization of H₂
- *Hydrogenation of N₂ on well designed inorganic architectures for highly efficient NH₃ synthesis
- *Frustrated Lewis pairs for metal-free hydrogenation catalysts
- *Fuel cells and hydrogen economy

Organizing committee

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