

Research Interest

In our everyday lives we are surrounded by petroleum products, from petrol fuel to polyesters for producing of the materials for cloth and polymer products. Catalysts are developed to reduce the activation energy required for chemical reactions and speed up the reactions, while at the same time opening up a variety of new routes. Thus, catalysts play a vital role in the production of products from petroleum. Functional catalysts can also help to reduce the environmental impact of production processes. Our aim is to develop new and more powerful catalysts for promoting material conversion processes for the purpose of efficient energy production and environmental harm minimization.

At the moment our research is also focused on creating solid acid-base catalysts for converting biomass resources. For instance, environmentally friendly hydrocarbon resources (cellulose) such as rice straw and wood scrap are readily available and easily recycled, and could play a major role in the production of renewable chemicals and alternative fuels as oil reserves become exhausted. To this end, we are continually designing, preparing, testing and analyzing new catalysts in a bid to find the optimum solution for each process. And in the future, we will see further advances in technology for conversion of non-petroleum base materials used to make liquid fuels and chemicals, which could pave the way for the so-called hydrogen-based society. If we can develop processes for making hydrogen from a variety of renewable resources, this would make a very significant contribution to solving the problem of global warming. Thus, one of our key challenges is the development of viable hydrogen production technology.

In addition to the research in catalysis, we also focus on the development of material for capturing heavy metal from wastewater and drinking water. Wastewater or drinking water containing heavy metal ions is considered as the serious environmental problem in human society.

Adsorption as the widely used method plays an important role in water treatment, which is based on the physical interaction between metal ions and sorbents. With the development of porous nanomaterials are used as the sorbents in water treatment; we have proved that porous nanomaterials are one of the effective sorbents for the capturing heavy metal ions from wastewater or drinking water due to their unique structure properties. Besides, the adsorption isotherm model and adsorption kinetics are studied to understand the adsorption procedure.

MAIN RESEARCH THEMES

- Design of solid catalysts for converting resources
- Elucidating the reaction mechanisms over solid catalysts
- Developing catalysts for making hydrogen and synthesis gases from natural gas and biomass
- Developing catalysts for converting carbon dioxide into useful chemical products
- Developing adsorbent for capturing of heavy metals
- Developing catalytic reaction processes for producing biomass-derived chemicals
- Developing catalytic reaction processes for producing high RON petrol fuel

Contact [sugeng\[at\]utm.my](mailto:sugeng[at]utm.my) or [sugengtw\[at\]gmail.com](mailto:sugengtw[at]gmail.com) for further inquiry of research.