

## ON THE EFFICIENT TRANSFORMATION OF CO<sub>2</sub> TO USEFUL CHEMICALS

Jorge Gascon

*King Abdullah University of Science and Technology, KAUST Catalysis Center (KCC),  
Advanced Catalytic Materials, Thuwal 23955, Saudi Arabia.*

The increasing global CO<sub>2</sub> levels has led to a massive thrust in research on both Carbon Capture and Storage (CCS) and Carbon Capture and Utilization (CCU). It has been posited that, in terms of volume, the contribution of CCU will be significantly less as compared to CCS for avoiding CO<sub>2</sub> emissions and achieving the “2 degree scenario” (2DS) goals. However, what cannot be denied is that the immediate economic potential of CCU far outweighs that of CCS especially considering the fact that large scale capital investment is required in case of the latter.

While it is clear that CCS does need to be implemented in order to realistically achieve the 2DS goals, what is not commonly considered is that instead of approaching CCS and CCU as two separate methods of carbon mitigation, we should think of how CCU can, in fact, help address the problems faced for the implementation of CCS. With research intensifying on CCU, it is not impractical to think of an economic cycle where the profits gained from CCU can help to offset the costs of CCS if an integrated system of CCSU (Carbon Capture Storage and Utilization) is implemented. The reuse of stored CO<sub>2</sub> can become beneficial if consumption of fossil fuels is greatly reduced over the next century and the stored CO<sub>2</sub> becomes the chief feedstock for carbon-based chemicals.

In this presentation, we will present several routes based on careful choice of catalytic components and reactor configuration to increase selectivity and productivity in the direct hydrogenation of CO<sub>2</sub> to methanol, light olefins, aromatics and liquid fuels.