

## **Extracting CO<sub>2</sub> from the Atmosphere using Amine-Modified Silicates: A Carbon Negative Technology**

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Worldwide energy demand is projected to grow strongly in the coming decades, with most of the growth in developing countries. Even with unprecedented growth rates in the development of renewable energy technologies such as solar, wind and bioenergy, the world will continue to rely on fossil fuels as a predominant energy source for at least the next several decades. To meet the targets of the 2015 Paris Climate Agreement, it has been concluded that negative carbon technologies, those that extract CO<sub>2</sub> from the atmosphere, will be needed. In this lecture, I will describe the design and synthesis, characterization and application of new aminosilica materials that we have developed as cornerstones of new technologies for the removal of CO<sub>2</sub> from dilute gas streams, including ultra-dilute streams such as ambient air. I will discuss their mechanism of operation in cyclic CO<sub>2</sub> adsorption/desorption cycles, and link the performance of the materials with their structure. The potential for negative carbon technologies based on “direct air capture” will be explored.