

## *Carbon Dioxide Sequestration to form Calcium Carbonate Nanoparticles*

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The emission of carbon dioxide caused by burning fossil fuels is one of the leading sources of global warming. Reducing the amount of CO<sub>2</sub> released into the atmosphere through carbon sequestration can mitigate this problem. One method of carbon sequestration is the use of a carbon dioxide scrubber. Once captured, CO<sub>2</sub> can be used to create a valuable chemical commodity such as calcium carbonate nanoparticles. To create CaCO<sub>3</sub> particles in the 50-100 nanometer range, a chemical additive is necessary to limit particle size. The study used a laboratory scale carbon dioxide scrubber to react CO<sub>2</sub> with calcium chloride and OH<sup>-</sup> ions to form calcium carbonate nanoparticles. Varying CaCl<sub>2</sub> concentrations were tested as well as two chemical additives (AOT and PEG) in varying amounts. The resulting CaCO<sub>3</sub> nanoparticles were analyzed to determine average particle size using dynamic light scattering. The study confirmed that the scrubber process effectively reduced CO<sub>2</sub> released from the system. In general, larger quantities of additive led to smaller particles, but while AOT and PEG both limit CaCO<sub>3</sub> particle size, AOT was the most effective. Unexpected results showed that larger concentrations of CaCl<sub>2</sub> reduce the formation of bubble build-up in the reactor. Future work can be done to explore this effect of CaCl<sub>2</sub> on sud formation by monitoring and recording bubble levels during the reaction.