458g Development and Testing of Multipollutant Sorbents for Coal Flue Gas

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Because of its low cost and relative abundance, coal remains one of the primary sources of fuel for power generation in the U.S. The combustion of pulverized coal however is associated with the emission of a number of pollutants, namely SO_2, NO_x, and Hg. In order to make coal combustion a "clean", viable alternative to imported fossil fuels, new plants need to be built and old plants retrofitted with technology to reduce these pollutants. Under the cap-and-trade programs currently in place to manage these pollutants in the U.S., the most economic approach may be to use a single technology that moderately reduces all of these components rather than multiple technologies to remove each one completely.

We have been studying the use of sorbents based on hydrotalcite-like compounds (HTlc's) to capture SO_2, NO_x, and Hg from a simulated coal flue gas. The chemical and physical properties of the HTlc's are easily manipulated in the lab making them ideal candidates for studying the underlying phenomena governing the adsorption of these pollutants. In our study, we synthesized a number of HTlc's as well as looked at commercially available products containing HTlc's. The sorbents were characterized using a number of techniques, including temperature programmed desorption. The capacity of the sorbents was then measured in a bench scale, fixed bed system using a simulated coal flue gas. Several sorbents were found to have high capture capacity in either Hg or SO_2 and NO_x and further research is being conducted on how to merge these capabilities.