Carbon Dioxide Capture and Storage Utilizing Metal Hydroxides and Biochar

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Carbon dioxide is one of the most controversial atmospheric gasses due to its greenhouse effect on global climate. There are many discussions and agreements about how to reduce the production and release of carbon dioxide. However, regulating future emission of CO2 does not address the impact of what has been already released for the past several decades. Unfortunately, removing the existing carbon dioxide in the atmosphere is a challenging task due to its chemical stability. This project proposes two methods to capture CO2 and store it permanently. The first path is to use Alkali metal hydroxides, which are known to be efficient at CO2 capture and subsequently forming metal carbonates. Carbonates have numerous applications and therefore, provide a path to permanently storing the captured carbon from CO2. There are two important factors to consider for this path: CO2 should not be emitted during metal hydroxide production and the metal carbonates should be safe to be stored or used for other applications. Different metal hydroxides were compared for their CO2 capture capacity and environmental impact. The second path for capturing CO2 is using biological charcoal (biochar). Biochar was made by heating up pieces of wood in an oxygen deprived environment. Biochar adsorbed CO2, but not as fast as the metal hydroxides.The temperature, time and surface area are key parameters in improving the CO2 capture efficiency. Biochar is made from abundant biomass and known to be beneficial to the environment since it retains water and nutrients for the soil and has little negative effect. Therefore, biochar is a very strong candidate for storing CO2 in farm lands over metal hydroxides.

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