Research Assessment #5

Date: October 16th, 2020

Subject: The Role of Nanotechnology on Post-Combustion CO2 Absorption in Process Industries

Source:

Kumar, Ravinder, et al. "The Role of Nanotechnology on Post-Combustion CO2 Absorption in Process Industries." International Journal of Low Carbon Technologies, vol. 15, no. 3, Aug. 2020, pp. 361–367. EBSCOhost, doi:10.1093/ijlct/ctaa002.

Assessment:

As pollution is increasing rapidly around the world, we must figure out a method to combat it. Pollution is caused by the buildup of greenhouse gases as anthropogenically produced carbon dioxide emissions have been increasing rapidly. As the human population increases, and we use more and more coal, oil, and combustible gases for fuel, we exude carbon dioxide into the atmosphere. This study details that a solution to decrease the buildup of carbon dioxide in the atmosphere would be the use of carbon dioxide capturing and storing technologies. These technologies incorporate nanomaterials to increase absorption efficiency.

The study details some of the new carbon capture technologies involving different metals/materials in nanotechnology. The researchers found and gathered data on multiple trials in which nanomaterials were incorporated into carbon-capturing processes as well as methods in which these technologies can aid in pollution control. The properties of certain nanoparticles make them effective in capturing greenhouse gases. Using the data measured from these trials, the article was able to determine which materials were most effective in capturing carbon.

The data was determined through the use of a trial system in which different nanotechnologies were used in an isolated system against different greenhouse gases to test the amount that the technology captures. Once these measurements are completed, the absorption levels of the different gases were determined from the nanotechnologies. If the absorption levels had a positive correlation with nanotechnology, then it proved the effectiveness of the technology in capturing greenhouse gases. If the absorption levels did not have a positive correlation, then other forms of materials were experimented with in order to determine the most effective method to decrease greenhouse gases.

Once the data was collected, the study can be expanded if a plan is developed in which these nanotechnology systems can be implemented in the real world. It may take into account the economic feasibility of the carbon-capturing systems in order for the nanotechnology to become viable throughout the world, or at least in highly polluted areas.

Through conducting this research, the researchers were able to find a method/system that has the ability to capture and store greenhouse gases such as carbon dioxide with the use of nanotechnology as a catalyst. If the technology yields further results, another study could determine the economic feasibility of the system in real life. With the findings of the research, many highly polluted areas will be able to decrease their greenhouse gas emissions into the atmosphere, which would increase the sustainability of countries around the world.

The study concluded that CNT nanofluid is a good absorbent for the CO2 capture process. The synthesis of various nanoparticles through experiments may prove to be good for CO2 capture at high temperatures. Still, there exist a number of limitations with them and economical feasibility is still required. So, in the future, more focus is required on the

cost-effective synthesis process of nanoparticles to utilize them for CO2 capture. However, the study is very significant to the potential efforts to decrease pollution around the world.