

Green CO₂ capture using Zeolites

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According to the development plan of the UN 2030 Agenda for Sustainable Development, considerable efforts are needed globally to build a sustainable future. Most of the aspects of the UN 2030 Agenda can be achieved by sustainable innovations in reversing the climate crisis and controlling climate changes.

The concentration of greenhouse gases has increased drastically since pre-industrial times. The most important of them, CO₂, has increased from about 280 ppm in 1850 to over 410 ppm in 2021 and has led to the average temperature rising by over 1 ° C. According to the UN Climate Panel, this has already led to negative climate change (IPCC, Climate Change 2021). Therefore, the world needs to make radical alterations to prevent more severe consequences to climate change and global warming.

According to the Paris agreement, the world needs to act towards net-zero emissions by 2050. One of the most important actions to achieve this is to stop the emission of greenhouse gases including CO₂ and remove the CO₂ that has already been emitted. Currently, there are few CO₂ capture technologies available in the world for both point emission such as cement and chemicals factories and direct CO₂ capture from the atmosphere. Most of these technologies are based on the use of chemicals (amines, adsorbents coated with amines, etc.) and harsh conditions in the capture process. The use of amines is controversial as carcinogens such as nitrosamines and nitramines are formed during decomposition. This method also has odor problems associated with the process and produces a lot of waste and by-products that require special treatment before disposal.

GreenCap-Solutions has started the development of a new chemical-free concept for capturing carbon dioxide from point emissions and directly from air (DAC). The technology is free of chemicals and is based on the use of zeolites — a molecular sieve, to capture CO₂. The use of zeolite makes it possible to capture CO₂ down to very low concentrations (<1 ppm). The DAC concept is also beneficial for capturing CO₂ from non-stationary sources such as aircraft, ships and agriculture that do not point to emissions. Together with carbon storage (CCS) and/or utilization (CCU), DAC solutions will help stop and reverse carbon emissions. In addition, the scalability of the solution is suitable as a CCU for consumers of CO₂ such as greenhouses, breweries and slaughterhouses, and for applications where the emissions are not large enough to justify investing in a full CCS plant.

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