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Review Article

An Overview on the Carbon Utilization Technologies

With an approach to the negative emission construction material

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ABSTRACT

As an additional strategy to reduce carbon dioxide in carbon capture and storage, carbon sequestration, and utilization (CCU) is of great importance worldwide. Potential applications of the CCU range from using carbon dioxide in greenhouses and agriculture to converting carbon dioxide into fuels, chemicals, polymers, and building materials. CO₂ has been used for decades by advanced technologies in various industrial processes, including increased CO₂ recovery, food and beverage industries, urea production, water treatment, and firefighters' production and chillers. There are also many new technologies for using CO₂ in various stages of development and marketing. These technologies have the potential to create opportunities to provide emissions in power plants and other industrial sectors by replacing some raw materials for fossil fuels, increasing the efficiency and use of renewable energy, and generating revenue through the production of end-use products. This paper examines techniques for using carbon dioxide that convert carbon dioxide into commercial products through chemical and biochemical reactions with a focus on current technologies for broad supply or marketing. Carbon dioxide technologies are grouped according to technological conversion methods, such as electrochemical, photocatalysis and optical light, catalysis, biological processes (using microbes and enzymes), joint polymerization, and mineralization. In this paper, recent developments and the status of CO₂ technologies have been examined, and the environmental impacts of CCUs are also discussed in terms of life cycle analysis.

Keywords: CO₂ conversion; CO₂ to chemicals; CO₂ mineralization; negative emission materials; green concrete