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Advances of Materials and Processes in CO_2 Capture and Utilization

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Message from the Guest Editor

Carbon neutrality has become a worldwide concern of highest priority. Recent problems such as the COVID-19 pandemic, flooding and wildfire are caused by the global warming issue which is mainly attributed to CO_2 emission from fossil fuel combustion and industrial processes. There have been intensive research efforts on materials and processes to diminish the temperature rise in the atmosphere by global warming. Nonetheless, the solutions for achieving the carbon neutrality are still limited. CO_2 capture and storage (CCS) using solid porous adsorbent (metal organic framework, covalent organic framework, zeolite, activated carbon, etc.), liquid amine-based absorbent, and hybrid polymeric membranes with amine functionalization, porous adsorbent impregnation, etc. are important techniques that can be used to reduce CO_2 emission and minimize its negative impacts on climate changes. Furthermore, the advances of CO_2 utilization technology facilitate carbon neutralization, which includes the conversion of CO_2 to energy sources, polymers, and hydrocarbon intermediates.

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Message from the Editor-in-Chief

Continued developments in instrumentation and modeling have driven atmospheric science to become increasingly more complex with a deeper understanding of concepts, mechanisms, and interactions. This is the field that innovation built and it has led to a better appreciation for the complexity with atmosphere. Human life is intertwined in this complexity as we strive to better understand our atmosphere. Climate change is constantly stretching the limits of our thinking and forcing new ideas and concepts to be played out. Welcome to the Anthropocene!

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