MAGNESIUM OXIDE-BASED SORBENTS FOR CARBON DIOXIDE CAPTURE: FROM FUNDAMENTALS TO PRACTICE

Associate Professor, **Jeong Gil Seo**
Department of Chemical Engineering, Hanyang University

日時：2023 年 10 月 25 日（水）15：00～16：00
場所：大阪公立大学 学術情報総合センター　1F 文化交流室

Despite numerous efforts to decarbonize the energy sector, the rapid increase in CO_2 global emissions continues. Thus, the role of carbon capture and utilization in attaining net zero emissions remains indispensable. To further achieve so, several emerging technologies are being studied. This presentation aims to summarize various emerging sorbents and technologies for CO_2 capture. Among sorbents available for CO_2 capture, alkali nitrate salt-promoted MgO-based sorbents are given focus due to their high sorption capacities. In-situ TEM studies show that eutectic mixture (EM)-MgO sorbents undergo rearrangement and EM migration after multiple use, resulting in poor cyclability and reusability. Several strategies such as the use of stabilizers, supports, and employing a core-shell morphology were thus employed to achieve stable cyclic performances. Sorption mechanisms for each studied sorbent were also derived. Theoretical modeling suggests that an electric field (EF) promotes the adsorption of CO_2 on various CO_2 capture sorbents. However, this phenomenon has never been experimentally confirmed due to the lack of EF-responsive sorbents with measurable CO_2 sorption capacity. This study investigates the effect of an applied electric field on a eutectic mixture (EM)-promoted magnesium oxide sorbent with high CO_2 sorption capacity. Results show that the electric field effectively increased the CO_2 uptake of EM-MgO at significantly lower temperatures than its known operating range. Further investigation reveals that the electric field enhances the adsorption strength of CO_2 on the sorbent while also initiating the electrophoretic migration of EM ions, thus effectively redistributing the EM on the MgO surface during CO_2 sorption. The sample also exhibited stable sorption under cycling with alternating electric field directions, thus resolving the capacity loss commonly experienced by alkali nitrate salt-promoted MgO sorbents.

主催：大阪公立大学 大学院工学研究科
後援：二酸化炭素変換触媒研究会
　　触媒科学計測共同研究拠点
　　大阪公立大学人工光合成研究センター
参加費：無料
参加申し込み方法：Google form
https://forms.gle/vewJZYBi5z3zCiYe7

Osaka Metropolitan University

お問い合わせ・担当教員
大阪公立大学 大学院工学研究科
田村 正純
E-mail: mtamura@omu.ac.jp