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Advances in CO_2 capture technology: A patent review

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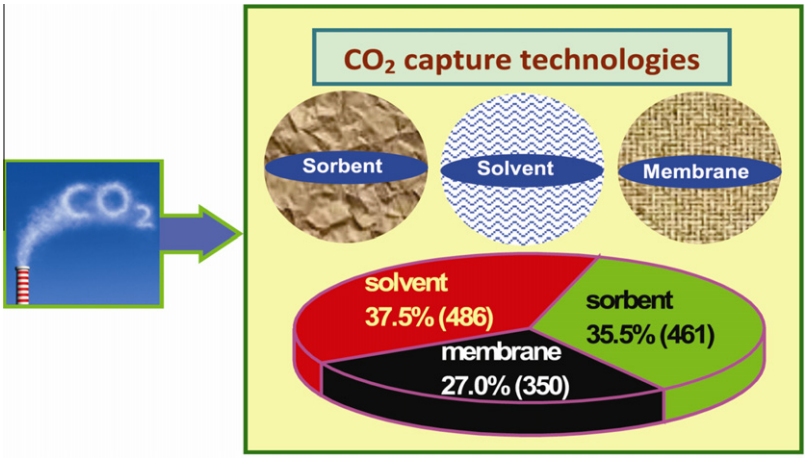
HIGHLIGHTS

- Timely updates on carbon capture technologies: More than 1000 patents on solvent, sorbent, and membrane.
- More patents on solvent and sorbent compared to membrane.
- Environmental and health concerns exist regarding carbon capture technologies.

GRAPHICAL ABSTRACT



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ABSTRACT

Carbon dioxide (CO_2) emissions are believed to be a major contributor to global warming. As a consequence, large anthropogenic CO_2 sources worldwide will eventually be required to implement CO_2 capture and storage technologies to control CO_2 emissions. In order to guide the establishment of policies for CO_2 removal, we reviewed the current status of CO_2 capture patents and technologies based on the Espacenet patent database and found that more than 1000 patents have been published on sorbent, solvent, and membrane. More than 60% of these patents were published since the year 2000, and a sharp increase in patent numbers was seen in the last several years; ~25% patents were published in the last 2 years. Substantially more patents on CO_2 removal and separation technologies are expected in the coming years. Meanwhile, the top four major types of patents, which consist of more than 2/3 of these patents, were patents granted by Japan (JP), United States (US), World Intellectual Property Organization (WO), and China (CN), and approximately half of the patents were JP and US patents. Unfortunately, no current technologies for removing CO_2 from large sources like coal-based power plants exist which satisfy the needs of safety, efficiency, and economy; further enhancement and innovation are much needed.

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