Journal of Cleaner Production 253 (2020) 119707

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Review

Recent trends in the development of adsorption technologies for carbon dioxide capture: A brief literature and patent reviews (2014–2018)

Farihahusnah Hussin [a, *], Mohamed Kheireddine Aroua [a, b]

[a] Research Centre for Carbon Dioxide Capture and Utilisation (CCDCU), School of Science and Technology, Sunway University, No. 5 Jalan Universiti, Bandar Sunway, 47500, Petaling Jaya, Selangor, Malaysia
[b] Department of Engineering, Lancaster University, Lancaster, LA1 4YW, UK

ARTICLE INFO

Article history:
Received 3 August 2019
Received in revised form
27 November 2019
Accepted 12 December 2019
Available online 18 December 2019

Handling editor: Prof. Jiri Jaromir Klemeš

Keywords:
Carbon dioxide capture
Post-combustion
Adsorption
Adsorbents
Patents

ABSTRACT

According to a recent report published by the United Nations in 2018, the increase in global temperature is possible to hit the 1.5 °C mark (the limit at which the detrimental impacts of climate change will be the most significant) between the year 2032 and 2050 due to the cumulative CO_2 emissions within the atmosphere. Therefore, it is crucial to tackle global warming because of its serious repercussions such as extreme changes in global weather, which can significantly impact human health and ecosystem. Global warming is caused by the emissions of greenhouse gases; therefore, many countries have established laws and policies to lessen the emissions of greenhouse gases. This study highlights the recently published articles and patents on CO_2 capture technologies through adsorption process from the year 2014–2018. Various types of adsorbent that can be potentially used to capture CO_2 are discussed. The published patents were obtained from the Derwent World Patents Index and it was found that over 500 patents have been published on the diverse categories of adsorbents which can be used to capture CO_2. The top five countries in the world with patents for CO_2 capture technology via adsorption are China, United States, World Intellectual Property Organisation, Japan and Korea. This study not only provides a summary of the recent innovations in this area, but also shows relevant information and technologies, which will benefit a wide range of readers including academics, researchers and industry professionals. In addition, it also highlights the patents with current innovation technology, application of CO_2 adsorption process in a real scale, patent applications filed in the past years in this field and knowledge gained from these patents which can be a guideline to develop various novel types of adsorbent and invent advanced technology in future.

Contents

* Corresponding author.
E-mail address: farihah@sunway.edu.my (F. Hussin).

https://doi.org/10.1016/j.jclepro.2019.119707
0959-6526/