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CONSTRUCTION OF ROAD MAP FOR ADVANCED FUNCTIONAL MATERIALS FOR REMOVAL OF HAZARDOUS POLLUTANTS IN AIR AND COMPARISON OF FIGURE OF MERIT (FOM)

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To effectively remove gaseous pollutants from air using sorbents, a thorough knowledge of the actual sorption performance is needed at ambient conditions rather than unrealistically high-pressure conditions, as is commonly presented in the literature. To this end, the sorbent capacities of gaseous pollutants including benzene, formaldehyde, ammonia, hydrogen sulfide, etc. were evaluated at a constant sorbent bed inlet pressure (e.g., 50 ppm or ~5 Pa), room temperature (298 K), a fixed flow rate (50 mL min⁻¹), and equal outlet sampling intervals (5 min). The adsorption patterns of various pollutants were investigated against diverse materials including advanced functional materials like metal organic frameworks, graphene materials, and conventional sorbents like activated carbons for references. The experimental results obtained for various pollutants by the tested sorbent materials were further assessed by the Langmuir, Henry's law, Freundlich, Dubinin-Radushkevich and Elovich isotherm models. The linearized Langmuir adsorption isotherms were evaluated in various respects to help develop a road map for pollutant removal by diverse materials. Further, the best figure-of-merit data for each material was then assessed based on a high 10% breakthrough volume (BTV) and the actual cost involved for real-world applications.

BIOGRAPHY

Ki-Hyun Kim was at Florida State University for an MS (1984-1986) and at University of South Florida for a PhD (1988-1992). He was a Research Associate at ORNL, USA (1992 to 1994). In 1999, he joined Sejong University. In 2014, he moved to the Department of Civil and Environmental Engineering at Hanyang University. His research areas broadly cover the various aspects in the field of air quality and material engineering in connection with advanced novel materials like coordination polymers. He was awarded as one of the top 10 National Star Faculties in Korea in 2006. He is a serving Editorial Board Member of several journals (e.g., *Environmental Research*, *Atmospheric Pollution Research*, and *Sensors*). He has published more than 530 articles, many of which are in leading scientific journals like *Chemical Society Reviews*, *Progress in Material Science*, *Progress in Polymer Science*, *Coordination Chemistry Reviews* and *Trends in Analytical Chemistry*.

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