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Application of Carbon Aerogel in the Adsorption of Polycyclic Aromatic Compounds from Diesel Exhaust

Graphene-based materials, such as graphene oxide (GO) [1], reduced graphene oxide [2] and carbon aerogel (CA) [3], have attracted worldwide attention in recent years because of their outstanding properties. Graphene exhibits excellent physical and chemical properties and can be easily modified [4]. Graphene and graphite oxide materials exhibit excellent performance in adsorption with polycyclic aromatic hydrocarbons (PAHs) and their derivatives [5, 6]. In Taiwan, the number of car and motor vehicles has been progressively increasing. Moreover, the exhaust gases emitted by vehicles often contains many pollutants, including metal elements, suspended particular matter, volatile organic pollutants and PAHs etc [7]. Vehicular emissions of particulate and gas-phase PAHs are of particular interest because of their potentially toxic and probable human carcinogenic compounds [8]. Furthermore, rapid vehicular growth rate has increased vehicular emissions, which have become one of the principle anthropogenic sources of PAHs. Polyurethane foam (PUF) and commercial XAD polymer resin are the adsorbents announced by the EPA. In this study, we present reusable and efficient carbon aerogel (CA) adsorbent for particulate and gas-phase PAHs emitted from diesel vehicles. We demonstrate that CA material is highly adsorption efficiency for human carcinogenic compounds. Because of superior adsorption capacity of PAHs, CA is possible to be the excellent environmental and air pollution adsorbent material in the future。

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