

# Spherical amine grafted silica aerogels for CO<sub>2</sub> capture

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## Abstract

The objective of this research was to develop a novel spherical amine grafted silica aerogel for CO<sub>2</sub> capture. A spherical silica gel was synthesized by dropping the sodium silicate based silica sol into an oil bath. Amine grafting was achieved by bonding the 3-aminopropyltriethoxysilane onto the framework of the silica gel. The spherical amine grafted silica gels were dried with vacuum drying to prepare the spherical amine grafted silica aerogels (SASAs). The synthetic mechanism of the SASAs was proposed. The structures and the CO<sub>2</sub> adsorption performances of SASAs were investigated. The amine loading of the SASAs increased with the grafting time, however, the specific surface area and pore volume sharply decreased owing to the blockage of the pore space. Excess amine loading led to the decrease of the CO<sub>2</sub> adsorption capacity. The optimal CO<sub>2</sub> adsorption capacity was 1.56 mmol/g with dry 1% CO<sub>2</sub> and at 35 °C. The synthetic method is low-cost and environmentally friendly, and the resulting adsorbent is capable.

**Keywords:** spherical aerogel; silica aerogel; amine grafting; CO<sub>2</sub> adsorption

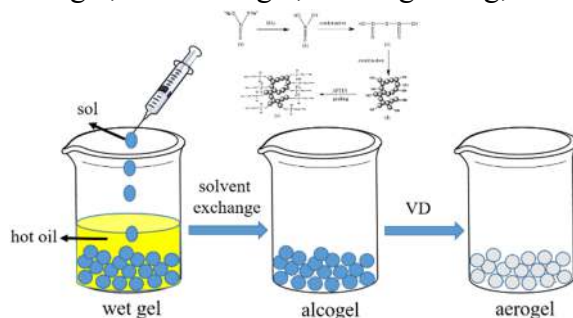


Fig.1 graphical abstract of SASAs.

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