SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Chemistry Department, Requimte

Adsorption Science and Technology

Research Unit of Adsorption Separation and Process Engineering

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- Post-Doc Researcher at FCT/UNL since May of 2013.
- PhD in Chemical and Biological Engineering (FEUP, March 2013).
- Track record of 8 peer-reviewed papers.

Objectives

Development of cyclic adsorption processes (Pressure/Vacuum Swing Adsorption, PSA/VSA and Simulated Moving Bed, SMB) for the separation, purification and storage of gases with energy and environmental interest.

Target areas: Biogas upgrading and CO_2 capture from flue gases.

Study of state-of-the-art adsorbents such as metal-organic frameworks (MOFs), carbon nanotubes (CNTs), and also activated carbon honeycomb monoliths, and zeolites.

Gravimetric apparatus for adsorption equilibrium determination

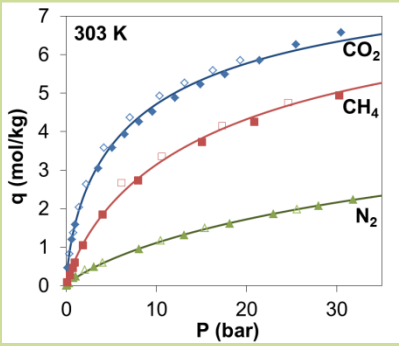
Methodology

Screening of suitable adsorbents for CO_2/CH_4 and CO_2/N_2 separations

Mathematical modelling of cyclic adsorption processes: computational simulation and experimental validation.

Computer-based design and optimization of adsorption processes for bio-CH_4 purification and CO_2 capture

Experimental validation of the simulation/optimization results

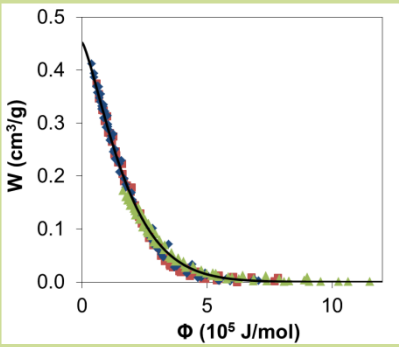


Adsorption isotherms of CO_2 (♦), N_2 (▲), and CH_4 (■) on MIL-53(Al) at 303 K. The solid line represents the fitting with the Sips model.

Expected Results

Design of SMB cycles for biogas upgrading to bio-CH_4 (>97% purity) with co-capture of CO_2. The environmental impact of the bio-CH_4 purification will be lower since the prevention of CO_2 emissions to the atmosphere is also ensured.

Design of PSA/VSA processes for capture of high purity CO_2 (>95%) from flue gases of fossil-fuelled power plants. This is a vital approach in the CO_2 mitigation strategy since it is the only way of ensuring a secure energy supply while developing reliable renewable energy sources.



APT characteristic curve of CH_4 (■), CO_2 (♦) and N_2 (▲) on MIL-53(Al); the solid line represents the fitting with the D–A isotherm model.

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