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Patent Search

Invention Title	AN Amine grafted AGRICULTURAL WASTE BASED aerogel with in-situ hydrophobicITY for CO2 capture
Publication Number	51/2021
Publication Date	17/12/2021
Publication Type	INA
Application Number	202141057075
Application Filing Date	08/12/2021
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	CHEMICAL
Classification (IPC)	C02F0001280000, C08J0009280000, B01J0013000000, B01J0020280000, B01J0020240000

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Abstract:

ABSTRACT AN AMINE GRAFTED AGRICULTURAL WASTE BASED AEROGEL WITH IN-SITU HYDROPHOBICITY FOR CO2 CAPTURE Aspects of present disclosure relate to an Amine grafted agricultural waste based Aerogel, more specifically, it pertains to an Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO2 capture. A biodegradable and nontoxic natural agricultural waste cellulose based aerogel with low density (0.015 – 0.112 g/cc), high porosity (92.5-99.0%), and enhanced specific surface area (254.7-321.4 m²/g) characteristics has been synthesized through robust two steps viz. sol-gel preparation and the lyophilization. The in-situ amine grafting is observed to enhance the CO2 capturing ability of the aerogel and its super-hydrophobic character with a water contact angle of 143.6°. Further, the CO2 adsorption and desorption studies reveal adsorption capacity of about 0.4 mmol/g at NTP for the synthesized aerogel. Nevertheless, the flexibility, high compressive strength (12.74 MPa) together with the low thermal conductivity (0.028 – 0.049 W/mK) of the synthesized amine grafted agricultural waste aerogel multiplies its application as an effective CO2 adsorbent and thermal insulator.

- Schematic diagram of synthesis of amine grafted hydrophobic AWA

Complete Specification

Claims:We Claim:

1. An Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO₂ capture comprising a homogeneous sol-gel of an oleic acid-(3-aminopropyl) triethoxysilane (OA-APTES) sol-gel, and a Functionalized Cellulose Fibres-glyoxal-Polyvinyl Alcohol (FCF-GX-PVA) sol-gel; wherein the Functionalized Cellulose Fibres(FCF) is derived from agricultural waste; and wherein the FCF-GX-PVA sol-gel has GX crosslinked between the PVA and the FCF or Functionalized cellulose Fibres (FCF).
2. The Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO₂ capture as claimed in claim 1, wherein the proportions of FCF, GX and PVA are FCF:GX:PVA::0.25: 0.63:1.
3. The Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO₂ capture as claimed in claim 1, wherein the Amine grafted agricultural waste based Aerogel has a CO₂ adsorption capacity of 0.4 mmol/g at a temperature of 278 K.
4. The Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO₂ capture as claimed in claim 1, wherein the Amine grafted agricultural waste based Aerogel has thermal conductivity in the range of 0.028-0.049 W/m K.
5. A method of preparation of Amine grafted agricultural waste based Aerogel with in-situ hydrophobicity for CO₂ capture, the method comprising:
 - a) mixing (3-aminopropyl) triethoxysilane (APTES) to oleic acid (OA) forming equi-mole mixture of OA-APTES;
 - b) dissolving OA-APTES mixture in ethanol at 60°C through continuous stirring for 1 hour;
 - c) mixing 4 wt% Polyvinyl Alcohol (PVA) in distilled water with Functionalized Cellulose Fibres (FCF) by stirring for 30 mins to obtain a sol-gel;

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Page last updated on: 26/06/2019