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(54) Title of the invention : AN Amine grafted AGRICULTURAL WASTE BASED aerogel with in-situ hydrophobicITY for CO2 capture

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3)Dr. D. Srinavas Reddy

Name of Applicant : NA

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(57) 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 revealed an 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. Fig. 1 - Schematic diagram of synthesis of amine grafted hydrophobic AWA

No. of Pages : 28 No. of Claims : 6



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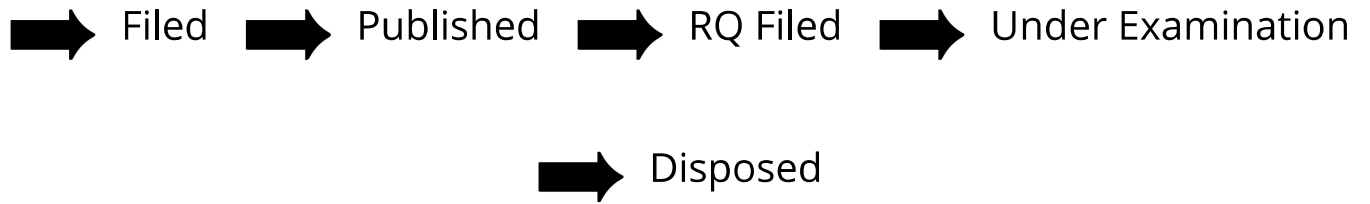
Application Details

APPLICATION NUMBER	202141057075
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	08/12/2021
APPLICANT NAME	1 . Dr. D. Tapas Kumar Dora 2 . Mr. Gopal Kumar 3 . Dr. D. Srinavas Reddy
TITLE OF INVENTION	AN Amine grafted AGRICULTURAL WASTE BASED aerogel with in-situ hydrophobicITY for CO2 capture
FIELD OF INVENTION	CHEMICAL
E-MAIL (As Per Record)	senanipindia@gmail.com
ADDITIONAL-EMAIL (As Per Record)	admin@senanip.com
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	17/12/2021

Application Status

APPLICATION STATUS	Awaiting Request for Examination
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 Department of Industrial Policy & Promotion,
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Document Name	Created Date/Uploaded Date
202141057075-FORM-26 [09-12-2021(online)].pdf	09/12/2021
202141057075-Proof of Right [09-12-2021(online)].pdf	09/12/2021
202141057075-COMplete SPECIFICATION [08-12-2021(online)].pdf	08/12/2021
202141057075-DECLARATION OF INVENTORSHIP (FORM 5) [08-12-2021(online)].pdf	08/12/2021
202141057075-DRAWINGS [08-12-2021(online)].pdf	08/12/2021
202141057075-FORM 1 [08-12-2021(online)].pdf	08/12/2021
202141057075-FORM-9 [08-12-2021(online)].pdf	08/12/2021
202141057075-POWER OF AUTHORITY [08-12-2021(online)].pdf	08/12/2021
202141057075-REQUEST FOR EARLY PUBLICATION(FORM-9) [08-12-2021(online)].pdf	08/12/2021
202141057075-STATEMENT OF UNDERTAKING (FORM 3) [08-12-2021(online)].pdf	08/12/2021

FORM 1 THE PATENTS ACT 1970 (39 of 1970) & The Patents rules, 2003 APPLICATION FOR GRANT OF PATENT [See section 7, 54 & 135 and rule 20 (1)]	(FOR OFFICE USE ONLY) Application No: Filing Date: Amount of Fee Paid: CBR No: Signature:																
1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)																	
2. TYPE OF APPLICATION [Please tick (√) at the appropriate category]																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Ordinary (√)</td> <td colspan="2">Convention ()</td> <td colspan="2">PCT-NP ()</td> </tr> <tr> <td>Divisional ()</td> <td>Patent of Addition ()</td> <td>Divisional ()</td> <td>Patent of Addition ()</td> <td>Divisional ()</td> <td>Patent of Addition ()</td> </tr> </table>		Ordinary (√)		Convention ()		PCT-NP ()		Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()				
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3. (3A) APPLICANT																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Name</th> <th style="width: 10%;">Nationality</th> <th style="width: 10%;">Country of Residence</th> <th style="width: 50%;">Address</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Dr. D. Tapas Kumar Dora</td> <td style="text-align: center;">Indian</td> <td style="text-align: center;">India</td> <td>Department of Chemical Engineering, GMR Institute of Technology, Rajam Andhra Pradesh</td> </tr> <tr> <td style="text-align: center;">Mr. Gopal Kumar</td> <td style="text-align: center;">Indian</td> <td style="text-align: center;">India</td> <td>Department of Petroleum & Energy Studies, DIT University, Dehradun Uttarakhand</td> </tr> <tr> <td style="text-align: center;">Dr. D. Srinavas Reddy</td> <td style="text-align: center;">Indian</td> <td style="text-align: center;">India</td> <td>Department of Petroleum Engineering & Earth Sciences School of Engineering University of Petroleum & Energy Studies, Dehradun Uttarakhand</td> </tr> </tbody> </table>		Name	Nationality	Country of Residence	Address	Dr. D. Tapas Kumar Dora	Indian	India	Department of Chemical Engineering, GMR Institute of Technology, Rajam Andhra Pradesh	Mr. Gopal Kumar	Indian	India	Department of Petroleum & Energy Studies, DIT University, Dehradun Uttarakhand	Dr. D. Srinavas Reddy	Indian	India	Department of Petroleum Engineering & Earth Sciences School of Engineering University of Petroleum & Energy Studies, Dehradun Uttarakhand
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Dr. D. Srinavas Reddy	Indian	India	Department of Petroleum Engineering & Earth Sciences School of Engineering University of Petroleum & Energy Studies, Dehradun Uttarakhand														
3B. CATEGORY OF APPLICANT [Please tick (√) at the appropriate category]																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Natural Person (√)</td> <td colspan="3">Other than Natural Person</td> </tr> <tr> <td></td> <td>Small Entity ()</td> <td>Start up ()</td> <td>Others ()</td> </tr> </table>		Natural Person (√)	Other than Natural Person				Small Entity ()	Start up ()	Others ()								
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	Small Entity ()	Start up ()	Others ()														

1. INVENTOR (S) [Please tick (√) at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes (√)		NO ()	
If "No", furnish the details of the inventor(s)					
Name		Nationality	Country of Residence	Address	
2. TITLE OF THE INVENTION					
AN Amine grafted AGRICULTURAL WASTE BASED aerogel with in-situ hydrophobicITY for CO₂ capture					
3. AUTHORISED REGISTERED PATENT AGENT(S)			IN/PA No.	3637	
			Name	Saurabh Kumar Jain	
			Mobile No.	9806186045	
4. ADDRESS FOR SERVICE OF APPLICANT IN INDIA			Telephone No. NA		
Dr. D. Tapas Kumar Dora Associate Professor, Department of Chemical Engineering, GMR Institute of Technology, Rajam, Andhra Pradesh India, PIN:532127			Mobile No. <u>+91 7303346331</u>		
			E-mail: senanipindia@gmail.com admin@senanip.com		
5. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION					
Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention country)
-NA-	-NA-	-NA-	-NA-	-NA-	-NA-
9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)					
International application number			International filing date		
-NA-			-NA-		
10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST)					

APPLICATION	
Original (first) application No	Date of filing of original (first) application
-NA-	-NA-
11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT	
Main application/patent No.	Date of filing of main application
-NA-	-NA-
12. DECLARATIONS:	
<p>(i) Declaration by inventor (s)</p> <p>(In case the applicant is an assignee: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).</p> <p>I/We, the above-named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.</p> <p>(a) Date:</p> <p>(b) Signature:</p> <p>(c) Name:</p> <p style="text-align: center;">Dr. D. Tapas Kumar Dora Mr. Gopal Kumar Dr. D. Srinavas Reddy</p>	
<p>(ii) Declaration by the applicant(s) in the convention country</p> <p>(In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)</p> <p>I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.</p> <p>(a) Date</p> <p>(b) Signature(s) -----NA-----</p> <p>(c) Name(s) of the signatory</p>	

(ii) Declaration by the applicant:

I/We, the applicant hereby declares that:-

- I am /we are in possession of the above-mentioned invention
- The ~~provisional~~/complete specification relating to the invention is filed with this application.
- ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.~~
- There is no lawful ground of objection to the grant of the patent to me/us.
- I am/we are the true & first inventor(s).
- I am/we are the assignee or legal representative of true & first inventor(s).
- ~~The application or each of the applications, particulars of which are given in Paragraph-8, was the first application in convention country/countries in respect of my/our invention(s).~~
- ~~I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.~~
- ~~My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph 9.~~
- ~~The application is divided out of my /our application particulars of which is given in Paragraph-10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.~~
- The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph-11.

(d) Following are the attachments with the application:

(a) Form 2

Item	Detail	Fee	Remark
Complete specification	No. of pages: 19	1, 600	
No. of Claim(s)	No. of claims: 06 No. of pages: 02		
Abstract	No. of pages: 01		
Drawings	No. of drawings: 10 No. of Pages: 06		

Priority	No. of Priorities:		
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~~In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.~~

- ~~(a) Provisional specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).~~
- ~~(b) Sequence listing in electronic form~~
- ~~(c) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).~~
- ~~(d) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.~~
- ~~(e) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.~~
- (f) Statement and Undertaking on Form 3
- (g) Declaration of Inventorship on Form 5

Total fee Rs. in Cash/ Banker's Cheque /Bank Draft bearing No.....
date.....on Bank

We hereby declare that to the best of my/our knowledge, information and belief the fact and matters slated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 8th day of December, 2021

Saurabh Kumar Jain
(IN/PA-3637)
Agent for Applicant

To,
The Controller of Patents
The Patent Office, At Delhi/Mumbai/Chennai/Kolkata, India.

FORM 5
THE PATENTS ACT 1970
(39 of 1970)
&
The Patents rules, 2003
DECLARATION AS TO INVENTORSHIP
[See section 10(6) and rule 13(6)]

1. NAME: OF APPLICANT (S)

1. Dr. D. Tapas Kumar Dora
2. Mr. Gopal Kumar
3. Dr. D. Srinavas Reddy

Hereby declare that the truth and first inventor (s) of the invention disclosed in the provisional specification filed in pursuance of my application numbered **2021** _____ dated _____ are.

2. INVENTOR (S)

NAME	NATION-ALITY	ADDRESS
Dr. D. Tapas Kumar Dora	Indian	Department of Chemical Engineering, GMR Institute of Technology, Rajam
Mr. Gopal Kumar	Indian	Department of Petroleum & Energy Studies, DIT University, Dehradun
Dr. D. Srinavas Reddy	Indian	Department of Petroleum Engineering & Earth Sciences School of Engineering University of Petroleum & Energy Studies, Dehradun

Date 08/12/2021



Saurabh Kumar Jain
 (IN/PA-3637)
 Agent for Applicant

3. DECLARATION TO BE GIVEN WHEN THE APPLICATION IN INDIA IS FILED BY THE APPLICANT (S) IN THE CONVENTION COUNTRY:-

-NA-

~~We the applicant(s) in the convention country hereby declare that our right to apply for a patent in India is by way of assignment from the true and first inventor(s).~~

Dated this ___ day of ___, 2020.

Signature:-NA Name: of signatory:- NA
To, The controller of patent The patent office, at Delhi/Mumbai/Chennai/Kolkata.