

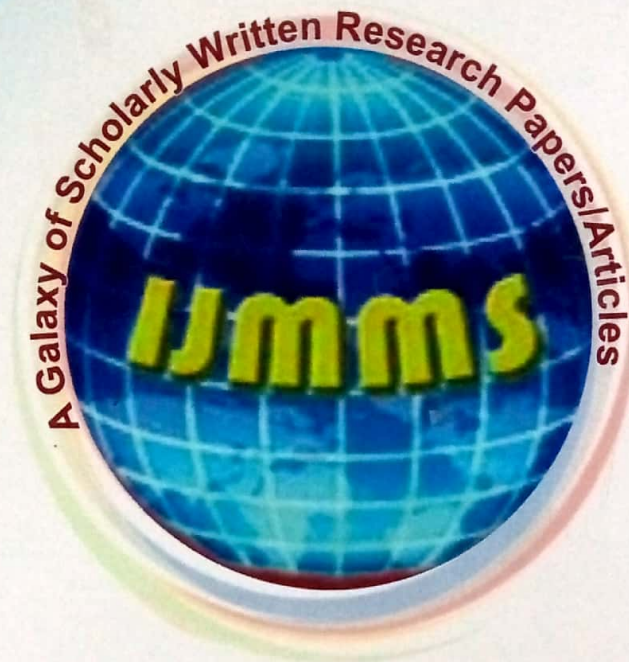
# **INTERNATIONAL JOURNAL OF MULTIFACETED & MULTILINGUAL STUDIES**

**UGC Approved Research Journal (Sr. 47674)**

**Volume V  
Issue IV**

**ISSN : 2394-207X (Print)  
IMPACT FACTOR : 4.205**

**April 2018**



**Chief Editor  
Dr. V. H. Mane**

**Executive Editor  
Prof. M. P. Shaikh**

**[www.ijmms.in](http://www.ijmms.in)**

**Email : [ijmms14@gmail.com](mailto:ijmms14@gmail.com)**



VOLUME-V, ISSUE-IV

ISSN (Print): 2394-207X

IMPACT FACTOR: 4.205

INTERNATIONAL JOURNAL OF MULTIFACETED AND MULTILINGUAL STUDIES



INTERNATIONAL JOURNAL OF MULTIFACETED AND MULTILINGUAL  
STUDIES

**UGC Approved Research Journal (Sr. 47674)**

**Editors: Dr. V. H. Mane, Prof. M. P. Shaikh**

**Language: Multilingual**

**Published by**

INTERNATIONAL JOURNAL OF MULTIFACETED AND MULTILINGUAL  
STUDIES

Sneh Apartment,  
Flat No. 001, Samarth Nagar, New Sangvi,  
Pune- 411027

**Copyrights: Editors 2014**

**All rights reserved**

**ISSN: 2394-207X (Print)**  
**IMPACT FACTOR: 4.205**

**VOLUME-V, ISSUE-IV**

**April-2018**



## Advisory Board

<b>Dr. Rajaram Zirange</b> , Professor and Head, Dept. of English, Bharati Vidyapeeth University, Pune, India	<b>Dr. Coomi Vevaina</b> , Professor, Dept. of English, Mumbai University, Mumbai, India
<b>Dr. Gholamreza Fathipour</b> , Professor, Islamic Azad University of Hamedan, Iran	<b>Dr. Chandrakant Rawal</b> , Principal, Brihan Maharashtra College of Commerce, Pune, India
<b>Dr. Mrs. Muktaja Mathkari</b> , Principal, MES' Abasaheb Garware College, Karve Road, Pune, India	<b>Dr. Srinivasrao Teki</b> , Professor, Dept. of Management, International College of Automotive, Malaysia
<b>Dr. Ananta Pegu</b> , Professor, Dept. of Economics, N.C.College, Badarpur, Karimganj, Assam, India	<b>Dr. Ravindra Thakur</b> , Professor, Dept. of Marathi, Shivaji University, Kolhapur, India
<b>Dr. Soumya Ghosh</b> , Dept. of Biotechnology, Stellenbosch University, South Africa	<b>Dr. Susan Silverstone</b> , Professor, Dept. of Commerce, National University, San Diego, Canada
<b>Prof. Karma Yoezer</b> , Professor, Dept. of Economics, School of Social Sciences, Royal University of Bhutan, Bhutan	<b>Dr. Utpal Kumar</b> , Professor, Dept. of Management, Patna University, Patna, Bihar (India)

## Editorial Board

<b>Dr. Pratibha Gaikwad</b> , Principal & Professor, D.G. College Satara, Shivaji University Kolhapur, India	<b>Dr. Antonis Balssopoulos</b> , Professor, University of Nikosia, Cyprus., Cyprus
<b>Dr. Vivek Rankhambe</b> , Professor, Bharati Vidyapeeth University, Pune, India	<b>Dr. Caroline Edwardsi</b> , Professor, Dept. of English, University of Lincoln, UK,
<b>Prof. Vitthal A. Naikwadi</b> , Director, Knowledge Resource Center, Baburaoji Gholap College, Pune, India	<b>Dr. Dorji Waugchuk</b> , Professor, Dept. of English, School of Arts & Humanities, Royal University of Bhutan, Bhutan
<b>Dr. Yogesh B. Kholam</b> , Co-ordinator Research Center, Dept. of Physics, Baburaoji Gholap College, Pune, India	<b>Dr. Paul Odundo</b> , Professor, University of Nairobi, Kenya
<b>Dr. Majeed A. Hatif Al Maryani</b> , Professor, Dept. Of Accounting, Al-Qadisiya University, Iraq.	<b>Dr. Pandit N. Shelke</b> , Principal, Annasaheb Waghire College of Science, Arts and Commerce, Otur University of Pune, Pune, India
<b>Mr. Ali Ghahremanlou</b> , Research Scholar, Canada	<b>Dr. Ashutosh Jawadekar</b> , Professor, Dept. of English, Pune, India

## Technical Assistance

<b>Dr. Vinod B. Mane</b> , Bharati Vidyapeeth University, Pune, India	<b>Mrs. Sunita S. Chavan</b> , Research Scholar, SRTMU, Nanded, India
---	---



## Index

Sr.	Name of the Paper	Name	Page No.
1.	Women Empowerment in Shobha De's <i>Starry Nights</i> and Manju Kapur's <i>Difficult Daughters</i>	Dr. Vijay D. Songire	1-4
2.	Gricean Analysis of Samuel Beckett's <i>Endgame</i>	Dr. Sagar S. Waghmare	5-7
3.	Critical Estimate of Presupposition: A Pragmatic Notion	Dr. Madhav Kamalakar Raul	8-9
4.	Implicatures and Turn-Taking: A Brief Overview	Mrs. Kunda Dattatraya Shimpi	10-11
5.	Pragmatic Study of Non-Linguistic Features in Absurd Drama	Dr. Samadhan S. Mane	12-14
6.	Culture: A Critical Survey	Dr. Minakshi Prakash Tilekar	15-16
7.	Portrayal of Immigrants in Rahul Varma's Selected Plays	Mr. Tulshiram L. Dabde	17-20
8.	Eco-friendly and Greener Synthesis of Benzopyran Derivatives by Using Gel Entrapped Catalysts	S. R. Shinde R. S. Gaikwad R. S. Salunkhe <sup>a*</sup>	21-24
9.	Challenges of Teaching English in Rural Area in the Present Set up	Shri. Hegade Navnath Dharmaji	25-28
10.	Gender and Caste Discrimination in Arundhati Roy's <i>The God of Small Things</i> and Bama's <i>Sangati</i>	Panjabrao Chavan	29-33
11.	Element of Absurdity in Vijay Tendulkar's <i>Silence! The Court is in Session</i>	Dipak P. Ganmote	34-39
12.	English Language Teaching and Learning through Technical Methods	Vaishali Shivaji Miskin	40-42
13.	Microscopic Crystal Structure Explorations of The Substituted N-Phenyl Succinimides and Glutarimides	Ravindra S. Dhivare <sup>1*</sup> Shankarsing S. Rajput <sup>2</sup> Prashant P. Chaudhari <sup>3</sup>	43-51
14.	Synthesis of Spiro-fused Heterocycles under Aerobic Conditions by using Polymer Gel Entrapped Catalyst	Shital Shinde Popat Pawar Rajashri Salunkhe <sup>a*</sup>	52-55
15.	A Case Study of Rain Water Harvesting Methodology in Sangola Taluka of Solapur District Maharashtra	<sup>1</sup> Mr. Parmeshwar T. Lokhande <sup>2</sup> Mr. Revannath V. Ligade <sup>3</sup> Mr. Dattatray K. Narale	56-60
16.	Electrochemical Study of Galvanostically Deposited Polypyrrole thin film for supercapacitor	P. M. Kharade <sup>a</sup> S.S. Mane <sup>b</sup> D. J. Salunkhe <sup>b*</sup>	61-63



17.	Optical Properties of Chemically Synthesized Polypyrrole Thin Films	J.V. Thombare <sup>1*</sup> , B.B. Navale <sup>1</sup> , A.R. Babar <sup>2</sup> , P.M. Kharade <sup>2</sup> , B.R. Karche <sup>2</sup>	64-66
18.	Durability of Superhydrophobic Candle Soot Layer Deposited on Adhesive Tape	Rajaram S. Sutar <sup>1</sup> , Anock Somadder <sup>1,2</sup> , Tushar M. Khot <sup>1</sup> , Smita B. Pawar <sup>1</sup> , Tejashwini B. Shinde <sup>1</sup> , Popat G. Pawar <sup>3</sup> , A. K. Bhosale <sup>1*</sup> , Sanjay S. Latthe <sup>1*</sup>	67-70
19.	A Review on Vibration Analysis of Various Crack Surfaces	Vivek U. Gaikwad <sup>a</sup> Prof.S.D.Katekar <sup>b</sup>	71-74
20.	Leaf Disease Detection System Using IoT	Kothavale D.C. <sup>1</sup> Chavan V.G. <sup>2</sup>	75-78
21	Computational Analysis of Crane Hook Using Different Materials	Hrushikesh D. Kulkarni <sup>a</sup> , Vishal H. Mali <sup>b</sup> , Sunil S. Gaikwad <sup>c</sup>	79-85
22	Fabrication of T-Type Microchannels Using Co2 Laser Machining	Somesh H. Burande, Aakash L. Bawale, Rajkumar P. Bile	86-89
23	Design and Analysis of Wheel Hub	Mr Rohit B Pawar <sup>1</sup> , Dr.N.K Nath <sup>2</sup> , Dr.S.B Satpal <sup>3</sup>	90-92
24	Identification of Indian Medicinal Plant by Using SVM Classifier	<sup>1</sup> Aitwadkar P.P., <sup>2</sup> Deshpande S.C., <sup>3</sup> Savant A.V.	93-96
25	Density Based Traffic Signal System Using Image Processing	<sup>1</sup> Bansode L.R. <sup>2</sup> Mulani A.A.	97-100
26	Design Evaluation of Solar Cooker by Using Multiple Criteria Decision Making	P.B. Shingare <sup>a</sup> B. S. Gandhare <sup>b</sup>	101-104
27	Detection of 'Bacterial Disease' on Pomegranate Using Image Processing	<sup>1</sup> Ritu Baban Bhosale <sup>2</sup> Shivanand Bapurao Tadwalkar	105-109
28	Human Face Recognition Using Combined DRLBP and SIFT Features with Fuzzy Classifier	Miss. Seema Atole (PG) <sup>1</sup> Ms. J. A. Kendule <sup>2</sup>	110-117
29	Positional Ternary Pattern Features Based Human Age Classification and Estimation Using Artificial Neural Network	<sup>1</sup> Miss. Jagtap Shamli (PG) <sup>2</sup> Prof. J.A. Kendule	118-125
30	Manufactured Sand (M-Sand) A Substitute for River Sand As A Fine Aggregate in Concrete	Dhulappa B. Borkar <sup>1</sup> Saurabh A. Dhon <sup>2</sup>	126-128
31	The Water Quality Loss: The Impact of Dust Pollution in South Katraj Region	Mr. Shrikant Shinde Mr. Nilesh Tabe <sup>1</sup> Prof. G. N. Supe <sup>2</sup>	129-136
32	Online Pharmacy Medical Store	<sup>1</sup> Mr. Shinde G.M., <sup>2</sup> Mr. Arkas B.D., <sup>3</sup> Ms. Nikam N.H.	137-140



33	Android Based Pomegranate Supply Chain Management	Varsha Sawant <sup>1</sup> Vijaya Gaikwad <sup>2</sup> Swaleha Inamdar <sup>3</sup>	141-145
34	Dynamic Job Ordering and Data Recovery in Cloud	Vidya Ananda Gaikwad	146-154
35	Implementing Remote Authentication and Protection on Biometrics for the Video Object Steganographic	Kashmira Khatib <sup>#1</sup> Prof. Rajguru A. A. <sup>*2</sup>	155-159
36	Cloud Computing- Opportunities and Challenges	Mr. S.M. Swant <sup>1</sup> Prof. S.M. Shinde <sup>2</sup>	160-164
37	Smart Blood Bank: An Android Application	<sup>1</sup> Mr. Shinde G.M. <sup>2</sup> Mr. Arkas B.D. <sup>3</sup> Ms. Pathan A.A.	165-168
38	Newly Developed Ni <sub>0.25</sub> Co <sub>0.75</sub> Al <sub>2</sub> O <sub>4</sub> Metal Catalyst Used in the Synthesis of Formamides by Formylation of Amines	Prakash Patil <sup>1*</sup> Sunil Mirgane <sup>2</sup> Bharat Pawar <sup>3</sup> Ravindra Dhivare <sup>4</sup>	169-171
39	AC and DC Electrical Properties of Nanoparticle Size Aluminum Substituted Cobalt Ferrite	<sup>1</sup> Mr. R.A.Bugad <sup>2</sup> Mr. B.B. Navale <sup>3</sup> Mr.B.R.Karche	172-176
40	Distributed Generation: New Approach towards Generation Technology	Kamble Prajkta R. <sup>1</sup> Mekhale Prajakta K. <sup>2</sup> Kangale Shubhangi S. <sup>3</sup>	177-180
41	Recognition of human emotions from observation of body resistance, Heart beat and Temperature	<sup>1</sup> Ms. Snehal S.Gaikwad <sup>2</sup> Prof.A.B.Jagadale	181-185
42	Electronic Voting Mechine using Microcontroller and GSM	<sup>1</sup> Ganesh N Shinde <sup>2</sup> Bapusaheb N Babar	186-190
43	Comparison of Wireless Health Care Onitoring System	A.A.Unune <sup>1</sup> A.B.Chounde <sup>2</sup> M.M.Patil <sup>3</sup>	191-199
44	Survey Analysis of Solid Waste Management Practices in Pandharpur City	<sup>1</sup> Prof. Dipali. K. Jugadar <sup>2</sup> Prof. Sanjay. A. Pawar	200-206
45	Influence of Sugar Cane Husk and Fly Ash on CBR Value of Black Cotton Soil	Shraddha S. Kulkarni	207-211
46	Impact of Information Technnology in Civil Engineering	Prof. Mrs. V. S Byakod	212-216
47	Mobile Technology: Issues and Challenges	Dr. Pandit Sambhaji Waghmare	217-221
48	Soil Nutrients Detection Using Image Processing	<sup>1</sup> Bhandare M.S <sup>2</sup> Chankeshwara R.K.	222-225



## Durability of Superhydrophobic Candle Soot Layer Deposited on Adhesive Tape

Rajaram S. Sutar<sup>1</sup>, Anock Somadder<sup>1,2</sup>, Tushar M. Khot<sup>1</sup>, Smita B. Pawar<sup>1</sup>, Tejashwini B. Shinde<sup>1</sup>, Popat G. Pawar<sup>3</sup>, A. K. Bhosale<sup>1\*</sup> and Sanjay S. Latthe<sup>1\*</sup>

<sup>1</sup> Self-cleaning Research Laboratory, Department of Physics, Raje Ramrao College, Jath 416 404, Maharashtra, India.

<sup>2</sup> Department of Physics, Shahjalal University of Science and Technology, Sylhet 3114, Bangladesh.

<sup>3</sup> Shivaji Polytechnic College, Sangola 413307, Maharashtra, India.

### Abstract:

Superhydrophobic surfaces are difficult to wet as the water drops makes contact angle higher than  $150^\circ$  and quickly roll off the surface on slight tilting. The superhydrophobic coatings can be fabricated by merely controlling the surface roughness and maintaining the low surface energy. We have fabricated the superhydrophobic coating on glass plate through candle soot deposition; however the coating showed poor mechanical stability. Hence, to achieve the durable candle soot based superhydrophobic surface, the adhesive tape was placed on the candle soot deposited glass plate and peeled off. The candle soot was firmly attached on the adhesive tape and the tape served as superhydrophobic surface. The candle soot layer on tape is less fragile as compared to candle soot layer on glass slide. The drop impact test and water jet impact tests confirmed the durability of the superhydrophobic surface.

**Keywords:** Superhydrophobic, wettability, contact angle, self-cleaning, sliding angle.

### 1. Introduction:

In nature, many natural surfaces show water repellency with water contact angle greater than  $150^\circ$  and sliding angle less than  $10^\circ$ , such surfaces are known as superhydrophobic. The biological surfaces such as lotus leaf [1], gecko's feet [2], and the wings of butterflies [3] surfaces show water repellent property. Such superhydrophobic surfaces have essential application in scientific research and engineering work. The carbon nanoparticles are available in different form such as carbon black, carbon nanotubes, coke, carbon nanofibres, diamonds, fullerene, glassy carbon, active carbon, and many. The carbon nanoparticles can be easily collected from the candle flame which shows superhydrophobic property without any physical and chemical surface modification. Liang et al [4] have reported that soot collected at tip of candle flame has hydrophilic and oleophilic due to incomplete combustion of wax vapor and those collected from middle of the flame are superhydrophobic and superoleophilic. In Wenzel state [5], the wettability of solid substance is proportional to roughness of solid surface. In Cassie-Baxter state [6] water droplets easily roll off due to trapped air in cavity of nano-and micro-structured rough surface.

When candle soot was directly deposited on glass slide, the candle soot was easily removed with water droplets. Seo et al [7] have fixed the candle soot on paraffin wax surface without any chemical modification and improved durability of candle soot. In such case paraffin wax act as a binder and improved drop impact durability up to a factor of 50, compared to a bare soot coating without a paraffin wax treatment. Xu et al [8] have reported that when candle soot combined with polydimethylsiloxane (CS-PDMS), it showed excellent superhydrophobicity with CA of  $160^\circ$  and the robustness was far better than the pure CS deposited on glass. In the present research work, to achieve the durable candle soot based superhydrophobic surface, the adhesive tape was placed on the candle soot deposited glass plate and peeled off. The candle soot was firmly attached on the adhesive tape and the tape served as superhydrophobic surface. The drop impact test and water jet impact tests confirmed the durability of the superhydrophobic surface.

### 2. Experimental Section



**2.1 Materials:** Glass slides (75 mm long  $\times$  25 mm wide) were purchased from Polar Industrial Corporation Mumbai (India). Candle (15 cm height  $\times$  2 cm diameter) and two sided adhesive tape was purchased from local market.

### 2.2 Preparation of superhydrophobic candle soot layer on adhesive tape

The preparation of superhydrophobic candle soot layer on adhesive tape is schematically depicted in Fig. 1. Candle soot was deposited on glass slide by holding it in the middle of the candle flame for different times (3, 6, 9 and 12 minutes). The adhesive tape was applied on candle soot deposited glass slide and gently pressed to make good contact between tape and glass slide. The tape was slowly peeled off from the glass slide. Adhesive materials on tape act as a binder, which bind soot particles on the surface of tape.

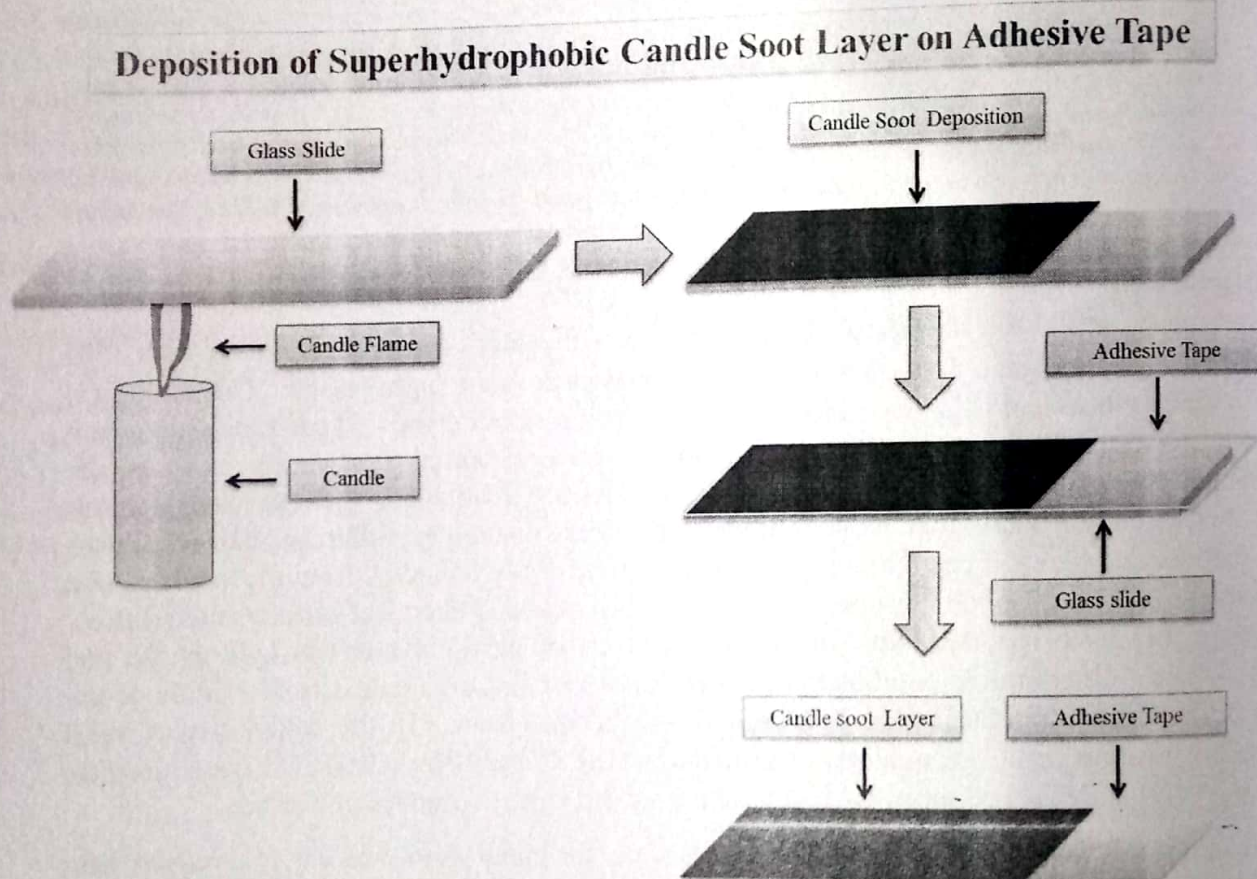


Fig.1: Deposition of superhydrophobic candle soot layer on adhesive tape.

### 2.3 Characterizations

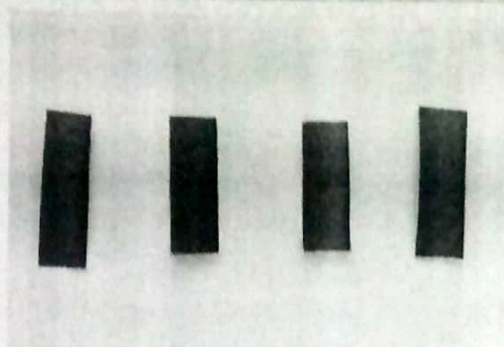
The wettability like water contact angle and sliding angle were measured by using Contact Angle Meter (Halmarc Co. Ltd.). The durability of the prepared coating has confirmed by water jet impact test and water drop impact test.

## 3. Results and discussion

### 3.1 Wettability of the prepared candle soot deposited surface

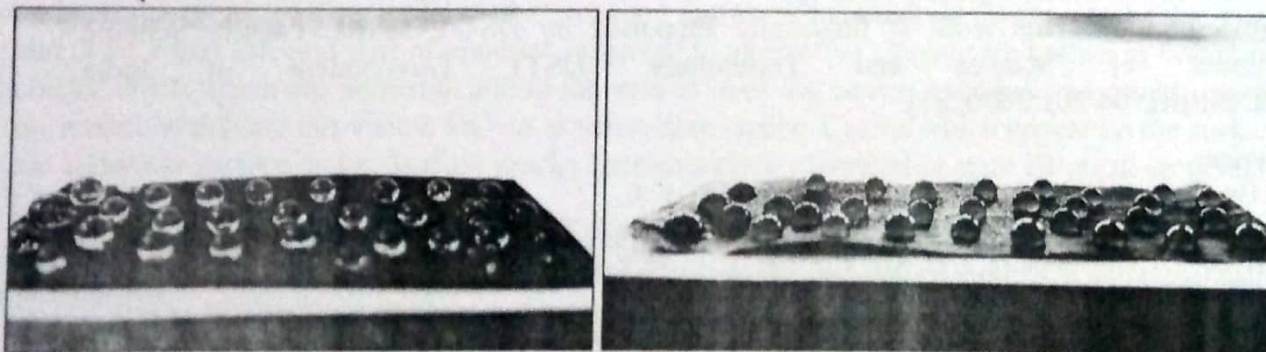
The adhesive tape was applied on the candle soot deposited glass plate and peeled off slowly to achieve durable candle soot based superhydrophobic surface on adhesive tape. Candle soot deposited adhesive tapes peeled off from the glass slides deposited with candle soot for 3, 6, 9 and 12 minutes (sequentially from left to right) are shown in Fig. 2. The appearance of transparent adhesive tapes was turned into black color due to candle soot deposition on the tape.





**Fig. 2:** Candle soot deposited adhesive tapes peeled off from the glass slides deposited with candle soot for 3, 6, 9 and 12 minutes (sequentially from left to right).

The water contact angles were measured on the candle soot deposited adhesive tapes peeled off from the glass slides deposited with candle soot for 3, 6, 9 and 12 minutes. The accurate water contact angle and sliding angle values were reported by measuring contact angles and sliding angles on five different positions on the each sample. All the samples showed water contact angle higher than  $153^\circ$  and sliding angle less than  $8^\circ$ . **Fig. 3** shows the optical photographs of water drops on the candle soot deposited adhesive tapes (peeled off from 12 and 06 minutes candle soot deposited glass plates). No pinning of water drops was observed on the surface and the water drops rolled off freely. While rolling, no candle soot was carried out off the surface as it was observed on candle soot deposited glass plate. The adhesive on the tape acted as a binder which holds carbon soot nanoparticles on the surface.

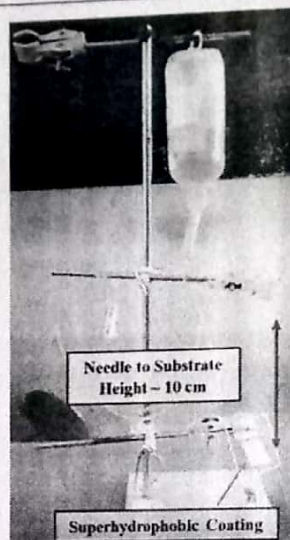


**Fig. 3:** Optical photographs of water drops on the candle soot deposited adhesive tapes (peeled off from 12 (left) and 06 minutes (right) candle soot deposited glass plates).

### 3.2 Durability of the superhydrophobic surface

The mechanical durability of the candle soot deposited adhesive tapes was checked by water drop impact test and water jet impact test. In case of candle soot deposited glass plate, the candle soot was washed away by the rolling water drops which were gently kept on the surface. The set up of water drop impact test is as shown in **Fig. 4**. A 500 ml plastic bottle was filled with water and connected to syringe by flexible plastic pipe. The drop falling rate was adjusted to 1 drop / 5sec. The needle to substrate distance was kept nearly 10 cm. The wetting properties of candle soot deposited adhesive tape were checked after every 30 minutes. It was observed that the wetting properties (both static and dynamic angles) of the superhydrophobic surface were intact for almost 2 h of water drop impact test. The contact angle reduced slowly to  $127^\circ$  after 5 h of continuous water drop impact test, which confirms the damage prone to the surface. The water jet impact test was also carried out on candle soot deposited adhesive tapes which confirmed no damage on the surface and water jet was just bounced off the surface.





**Fig. 4:** Set up of water drop impact test.

**Conclusion:** Simple deposition of hydrophobic candle soot on glass plate showed superhydrophobic wetting properties, however very fragile in nature. We improved the durability of superhydrophobic candle soot layer by simply applying it on the adhesive tape. The candle soot deposited adhesive tapes showed durability against water jet impact test and water drop impact test. The cheap and easily available candle soot can be used to prepare durable superhydrophobic coating and its cost can be greatly reduced.

**Acknowledgment:** This work is financially supported by DST-INSPIRE Faculty Scheme, Department of Science and Technology (DST), Government of India. [DST/INSPIRE/04/2015/000281].

#### References

- [1] W. Barthlott and C. Neinhuis, *Planta*, 1997, 202(1), 1–8.
- [2] H. Lee, B. P. Lee and P. B. Messersmith, *Nature*, 2007, 448(7151), 338–341
- [3] D. Byun, J. Hong, Saputra, J. H. Ko, Y. J. Lee, H. C. Park, B.-K. Byun and J. R. Luker, *J. Bionic. Eng.*, 2009, 6(1), 63–70
- [4] Liang, Can-Jian, et al. "Relationship between wettabilities and chemical compositions of candle soots." *Fuel* 128 (2014): 422-427.
- [5] Wenzel, R.N., Resistance of solid surfaces to wetting by water. *Industrial & Engineering Chemistry*, 1936, 28(8): p. 988-994.
- [6] Cassie, A. and S. Baxter, Wettability of porous surfaces. *Transactions of the Faraday society*, 1944, 40: p. 546-551.
- [7] Seo, Kwangseok, and Minyoung Kim. "Candle-based process for creating a stable superhydrophobic surface." *Carbon* 68 (2014): 583-596.
- [8] Xu, Chengyun, et al. "Fabrication of superhydrophobic soot-like surface." *Manipulation, Manufacturing and Measurement on the Nanoscale (3M-NANO)*, 2016 IEEE International Conference on. IEEE, 2016.