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Coatings for Glass Substrate and their Potential Applications Automobile Industry

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Abstract: In this research work six novel combinations of Hydroxy Ethyl Meth Acrylate based copolymers have been synthesized and commercial titania, after activation was added by adopting simple strategy to manufacture super-hydrophobic, cost effective, transparent, antifogging, self-cleaning and antimicrobial coating on the glass sheet which will be helpful for outdoor and automobile windscreen. The super-hydrophobic covering was set up by dip covering procedure and coated specimen have been characterized for Wetting behaviour, transparency and SEM analysis

Keywords: UV, PDMS, FTIR, coating, sulfides, soaps, chlorides, phosphides.

Remembering the water emergencies in many nations and cleaning impact, it has gotten urgent to safe water for endurance of living creatures by utilizing less quantity of water for cleaning purposes. Widow cleaning with manual method is also very difficult for high buildings which look shabby at their exterior high in the sky and it includes human injury, wastage of time money and water. If we use self-cleaning coatings, it will be very helpful to save things from weathering and provide environment friendly atmospheric conditions. Likely uses of super hydrophobic surfaces for self-cleaning building outsides, window glasses, car windshields, and water-proof materials. Super hydrophobic coatings have also received interest due to their anti-icing potential by reducing the time an impinging liquid droplet is in contact with the surface. Ice accumulation on airplanes is a significant hazard to human safety and the build-up of ice on car windshields is an annoyance in winter climates. Super-hydrophobic surfaces observed widely on many plants leaves naturally, insects epidermal layers and other extensions. Such type of surface has ability of self-cleaning to remove contaminants on them by rolling off falling water drops on them. From an application view, super-hydrophobic surfaces will become particularly useful when several functions transparency, photocatalytic properties and self-healing after damage. Now a day, attention is diverted towards modified economic coatings for antimicrobial, photocatalytic and self-cleaning properties. Titanium dioxide (TiO_2), for this purpose used in accordance with polymeric materials due to cost effective and its photocatalytic nature. Acrylic copolymers are used for coating purposes when titanium dioxide used along with acrylates it will provides better adhesion and good photocatalytic property. So glass surface made activated by increasing roughness of surface and then by applied coated material by dip coating method. Smooth and activated surfaces experience different water contact angle due to change in surface energy. The higher water contact angles is responsible for super-hydrophobic surfaces. In geometry, angle below and above 90° referred to the hydrophilic and hydrophobic nature of exterior respectively. And the limit of contact angle for hydrophilicity and hydrophobicity is ~ 65°. Henceforth, considering bond power, hydrophilic superficial suggests exteriors/surfaces having centres of the edge underneath 65°. whereas surfaces having angle more than 65° termed as hydrophobic exteriors. Same is the case observed in Berg Limits based on the adhesion forces. Super hydrophobic surfaces, Lotus leaf like surfaces. Superomniphobic surfaces provide effective chemical shielding and some other slippery and porous surfaces. Polymeric coating material has excellent antimicrobial activity against *E Coli.*. Fluorinated polymeric compounds also used for coating and coated surfaces has hydrophobic properties which increases its self-cleaning activity. Porous silicon has been used to produce hydrophobic structures resulting in improvement of wettability. Some coating materials has been

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developed with photocatalytic action on surfaces resulting in super-hydrophobicity. Diatomaceous earth material used to fabricate coatings having super-hydrophobic action. PDMS-Grafted-SiO_2/TiO_2 used to produce thin films that have multiple applications with photocatalitically stable super hydrophobicity. The acrylate-based polymers were prepared by varying the nature and ratios of the monomers.

FTIR and UV absorbance spectra of modified TiO_2 coatings FTIR analysis of modified acrylate copolymer showed the presence of TiO_2. The Spectra shows little difference with presence of TiO_2. The functionalization peaks seen in spectra due to absorption levels for Ti–O–C coordination. Following peaks have been shown 4000–3500 (not sharp peaks), OH stretching from HEMA, OH (Carboxylic Acids) 2952–3000 CH aliphatic and aromatic (peroxides in reaction mixture) and HEMA, 1750—1729 C=O from HEMA and Carboxylic derivative. 1470-1446 CH_3,CH_2 deformation,1237-1140 comes from C–O–C stretch from OH of HEMA and other polymer and peaks at 752-740 are due to Vibrational modes of TiO_2, 780-400 are showing some crystalline titanium-dioxide as shown below in Fig. 3 and Table 3 given above. Bare glass and Coated material have been analysed for UV absorption and recorded absorbance in ultraviolet and visible region. Developed coating materials did not absorb UV radiation in visible region while show minimum absorbance in ultraviolet region which is clearly shown from graphs obtained from UV–Visible spectroscopy. Results revealed that there is only 3–5% absorbance which means that 97–95% light transmittance which is good sign for UV protection

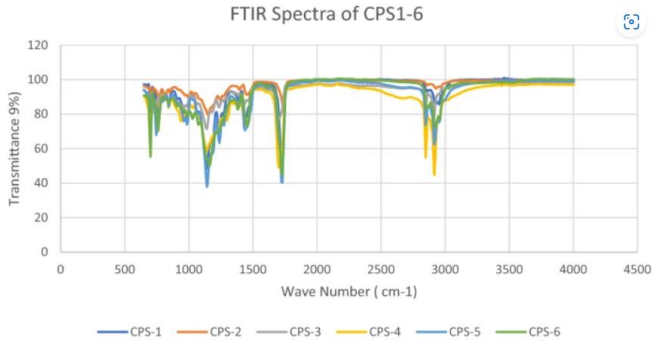

Fig.1. Fourier-Transform Infrared Spectroscopy

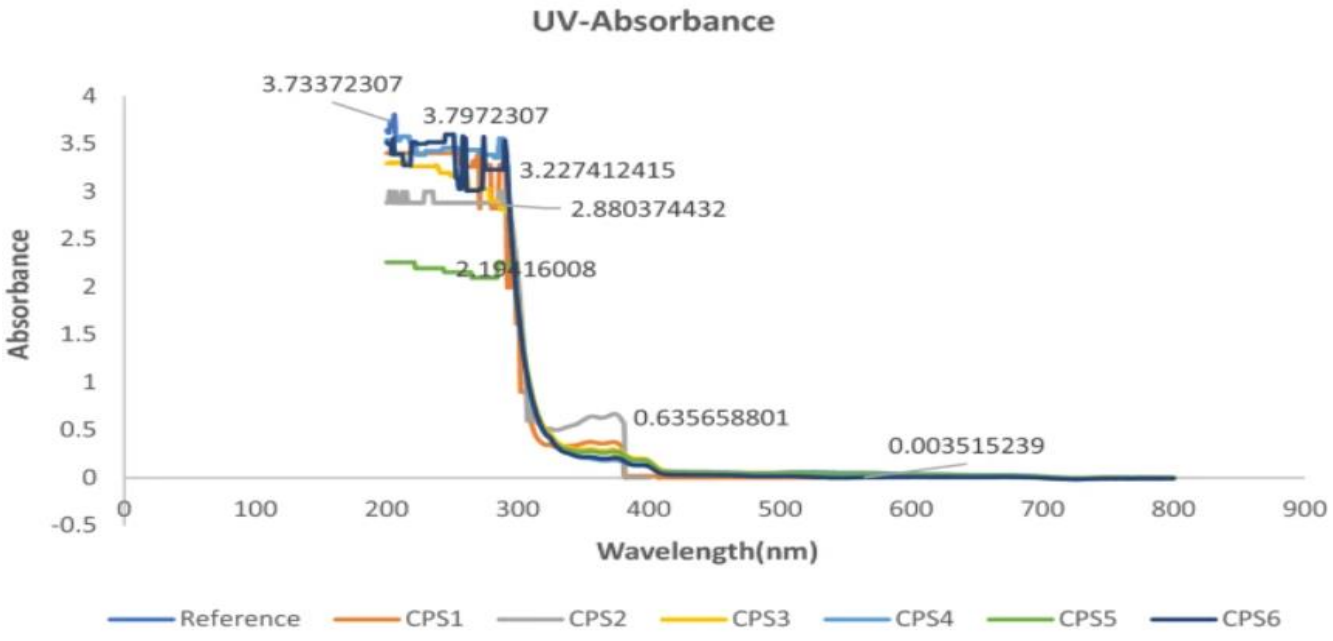

Fig.2. UV-Absorbance data for multiple samples (labeled as Reference)

Accordance with UV transmittance data in visible range, the Coated glass slides showing transparency results of more than 97% in the wavelength range of 400–800 nm which have indicated more

transparency of coating surface in visible region as compared to uncoated glass. Fog occurs in cold environment and vapours condense in the form of droplets on the glass surface which cause scattering of incident light and as a result surface becomes translucent or foggy giving poor optical performances. These polymeric Coatings are an easy approach towards anti-fogging activity. Due their high transparency these coating is best to use as protective coating on vintage things in museum. In comparison with uncoated glass, modified polymeric coating on the glass substrate recorded an average transparency of 97.5% instead of 94.3% within the wavelength range of 400–800 nm which is an indication of transparency in the visible region

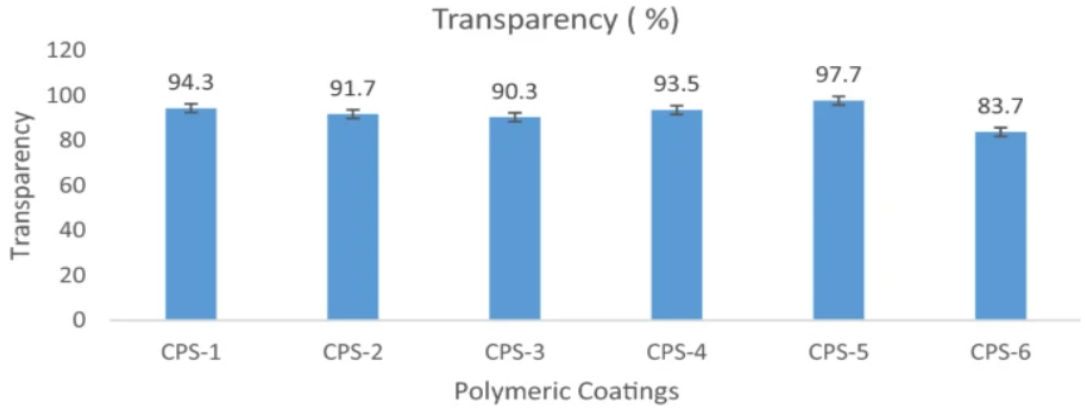

Fig.3. Vis absorbance spectrum for a set of samples (Reference)

References

1. Rayimjonovich M. A. Improvement of Operational Characteristics Crankshafts Made of High-Strength Cast Iron //Central Asian Journal of Theoretical and Applied Science. – 2023. – Т. 4. – №. 5. – С. 56-63.
2. Rayimjonovich M. A., Ogli A. M. M. FEATURES OF PRODUCTION PROCESSES BODY CASTINGS MADE OF HIGH-STRENGTH CAST IRON //European International Journal of Multidisciplinary Research and Management Studies. – 2023. – Т. 3. – №. 05. – С. 4-12.
3. Рубидинов Ш. Ғ. У. и др. МАТЕРИАЛЫ ТРИБОТЕХНИЧЕСКОГО НАЗНАЧЕНИЯ ЭРОЗИОННЫЙ ИЗНОС //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 480-486.
4. Қосимова З. и др. ТОЧНОСТЬ ИЗГОТОВЛЕНИЯ ПОРШНЕЙ В ЗАВИСИМОСТИ ОТ ВЫБОРА ЗАГОТОВКИ //Oriental renaissance: Innovative, educational, natural and social sciences. – 2021. – Т. 1. – №. 11. – С. 418-426.
5. Косимова З. М., Акрамов М. М. Ў. Технологические особенности изготовления поршней //Scientific progress. – 2021. – Т. 2. – №. 6. – С. 1233-1240.
6. Akramov M., Rubidinov S., Dumanov R. METALL YUZASINI KOROZIYABARDOSH QOPLAMALAR BILAN QOPLASHDA KIMYOVIY-TERMIK ISHLOV BERISH AHAMIYATI //Oriental renaissance: Innovative, educational, natural and social sciences. – 2021. – Т. 1. – №. 10. – С. 494-501.
7. Nomanjonov S. et al. STAMP DESIGN //Экономика и социум. – 2019. – №. 12 (67). – С. 101-104.
8. Rubidinov S. G., Mamirov A. R. The Influence of the Geometry of the Cutting Tool and Feed on the Height of Surface Irregularities and the Shape of Irregularities //Web of Semantics: Journal of Interdisciplinary Science. – 2024. – Т. 2. – №. 6. – С. 231-237.
9. Рузиев Ш. Н. и др. Расчет Допусков Посадки С Зазором С Помощью Программного Обеспечения //Web of Semantics: Journal of Interdisciplinary Science. – 2024. – Т. 2. – №. 6. – С. 196-202.

10. Tursunov S. T., Rubidinov S. G. Wear-Resistant Metal-Like Connections //Miasto Przyszłości. – 2024. – Т. 49. – С. 865-869.
11. Rubidinov S. G., Gaynazarov A. T., Xamdamov S. T. Assessment of a Developed Manual Drilling Machine for Little Scale Operation //Miasto Przyszłości. – 2024. – Т. 48. – С. 1242-1249.
12. Рубидинов Ш. РАЗРАБОТКА НАУЧНО-МЕТОДИЧЕСКИХ ПРИНЦИПОВ ПОЛУЧЕНИЯ КОМПОЗИЦИОННЫХ ПОЛИМЕРНЫХ КЛЕЕВЫХ ВЕЩЕСТВ //Conference on Digital Innovation:" Modern Problems and Solutions". – 2023.
13. Rubidinov S. G. Automation of Assembly and Installation Processes in Mechanical Engineering //American Journal of Engineering, Mechanics and Architecture (2993-2637). – 2023. – Т. 1. – №. 10. – С. 141-145.
14. Шохрух Г. У. Р., Гайратов Ж. Г. У. Анализ теории разъемов, используемых в процессе подключения радиаторов автомобиля //Science and Education. – 2022. – Т. 3. – №. 9. – С. 162-167.
15. Teshaboyev A. M., Meliboyev I. A. Types and Applications of Corrosion-Resistant Metals //Central asian journal of theoretical & applied sciences. – 2022. – Т. 3. – №. 5. – С. 15-22.
16. Mamatov S. A. et al. Paint Compositions for the Upper Layers of Paint Coatings //Middle European Scientific Bulletin. – 2022. – Т. 23. – С. 137-142.
17. O'g R. S. G. et al. Classification of Wear of Materials Under Conditions of High Pressures and Shock Loads. – 2022.
18. O'G'Li S. G. A. et al. Ishlab chiqarish va sanoatda kompozitsion materiallarning o'rni //Science and Education. – 2022. – Т. 3. – №. 11. – С. 563-570.
19. Шохрух Г. У. Р., Гайратов Ж. Г. У. Анализ технологической системы обработки рабочих поверхностей деталей вала на токарном станках //Science and Education. – 2022. – Т. 3. – №. 8. – С. 23-29.
20. Рубидинов Ш. Ғ. У., Раимжонов Қ. Р. Ў. Изменение микрорельефа поверхности и шероховатости допусков деталей после химичке-термический обработки борирования //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 34-40.
21. Рубидинов Ш. Ғ. Ў. Бикрлиги паст валларга совуқ ишлов бериш усули //Scientific progress. – 2021. – Т. 1. – №. 6. – С. 413-417.
22. Рубидинов Ш. Ғ. Ў., Ғайратов Ж. Ғ. Ў. Штампларни таъмирлашда замонавий технология хромлаш усулидан фойдаланиш //Scientific progress. – 2021. – Т. 2. – №. 5. – С. 469-473.
23. Рубидинов Ш. Ғ. Ў., Акбаров К. И. Ў. Машинасозликда сочилувчан материалларни ташишда транспортер тизимларининг аҳамияти //Scientific progress. – 2021. – Т. 2. – №. 2. – С. 182-187.
24. Рубидинов Ш. Г. У., Ғайратов Ж. Г. У. Кўп операцияли фрезалаб ишлов бериш марказининг тана деталларига ишлов беришдаги унумдорлигини тахлили //Oriental renaissance: Innovative, educational, natural and social sciences. – 2021. – Т. 1. – №. 9. – С. 759-765.
25. Qosimova Z. M. et al. Influence of The Design of The Rolling Roller on The Quality of The Surface Layer During Plastic Deformation on the Workpiece //International Journal of Human Computing Studies. – 2021. – Т. 3. – №. 2. – С. 257-263.
26. Todjiboyev R. K., Ulmasov A. A., Sh M. 3M structural bonding tape 9270 //Science and Education. – 2021. – Т. 2. – №. 4. – С. 146-149.
27. Отақулов О. Х. и др. Компрессор валларидаги салбий титрашларни бартараф этишда кимёвий термик ишлов бериб цементитлаш жараёнининг методологияси ва афзалликлари //молодой исследователь: вызовы и перспективы. – 2020. – С. 312-316.

28. Karimovich T. R., O'gli R. Z. O. Modernization of cnc machines //European International Journal of Multidisciplinary Research and Management Studies. – 2023. – Т. 3. – №. 04. – С. 107-113.
29. Karimovich T. R. et al. IMPROVING DETAIL ACCURACY IN THE PROCESSING OF CYLINDRICAL DETAILS IMPROVING THE INFLUENCING METHODS //Academia Science Repository. – 2023. – Т. 4. – №. 04. – С. 829-838.
30. Karimovich T. R., Obbosbek o'gli R. Z. Preparation for modernization of vertical cnc milling machine fp-17smn4 //Academia Science Repository. – 2023. – Т. 4. – №. 04. – С. 820-828.
31. Tadjibayev R., Homidjonov M. Processing of large length shafts //International Bulletin of Applied Science and Technology. – 2023. – Т. 3. – С. 813-818.
32. Tadjibaev R. K., Tursunov S. T. Scientific Research and Study Behavior of Curved Pipes Under Loads //CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES. – 2022. – Т. 3. – №. 3. – С. 81-86.
33. Tojiboyev R. K., Muxtorov A. M. O. G. L. AVTOOYNA ISHLAB CHIQARISHDA OYNAKLARNI VAKUUMLASH TURLARI VA ULARDA ISHLATILUVCHI VAKUUM XALQALAR KONSTRUKSIYASI //Scientific progress. – 2021. – Т. 2. – №. 1. – С. 681-686.
34. Таджибаев Р. К., Турсунов Ш. Т., Гайназаров А. А. Повышения качества трафаретных форм применением косвенного способа изготовления //Science and Education. – 2022. – Т. 3. – №. 11. – С. 532-539.