2015 FOCUS May 7, 2015 The Detroit Society for Coatings Technology			
Title	**Student**	**Award**	**Abstract**
Poster: Development and Evaluation of Super Hydrophobic Coatings	**Mahshid Niknahad**	**1st place**	Super hydrophobic surfaces have attracted much interest of scientists and engineers for both fundamental research and their practical applications such as contamination prevention, self-cleaning, and antifouling surface designs. Coatings with hydrophobic surfaces can be fabricated by controlling their topographic features and surface energies. Super hydrophobic coatings, showing extreme water repellency and characterized by water contact angle of > 150°, are designed by carefully controlling the coating surface roughness at the nano scales as well as their surface energies. In the present study, hydrophobicity of the sol-gel coating containing fluorinated side chains (low surface energy) was compared with the same coatings incorporated with hydrophobic nano and/or micro silica particles (surface roughness) in the matrix. The best hydrophobic property was observed for coating with Tetraethoxysilane (TEOS) and Methyltrimethoxysiliane (MTMOS), at a molar ratio of 1:2, incorporated with silica particles that are surface treated by polydimethylsiloxanes (PDMS) and dimethyldichlorosilane (DDS). The surface morphological study of these coatings showed good distribution of silica particles at the surface of the film, and contact angle measurement showed the static water contact angle as high as 152◦and sliding angle of <5°, indicating super hydrophobic behavior. These coating films have been characterized by Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), and static contact angle measurements. Their surface mechanical properties have been measured by nano indentation test.

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Poster 1: UV-Curable Organic-Inorganic Hybrid Coatings by Photo-Base Initiated Dual-Cure Mechanism **Poster 2: Design and Evaluation of Anti-microbial Coatings**	**Pallavi Bapat**	**2nd place**	In this study, a novel antibacterial surface composed of an organic-inorganic hybrid matrix of Quaternary Ammonium based Silane (QAS) precursor is designed. Three different QAS precursors were synthesized and characterized by its Amine value. A coating formulation based on Bis triethoxy silyl octane (BTEOS) and one of the synthesized QAS precursors was prepared and subsequently thin films were fabricated by the dip-coating technique using glass cover slips as substrates. Finally the coatings were tested in bacterial cultures of Escherichia coli to oserve their antibacterial properties. It was experimentally demonstrated that these QAS based organic-inorganic hybrid films have a very good antimicrobial behavior against this type of bacteria. In this study, a novel antibacterial surface composed of an organic-inorganic hybrid matrix of Quaternary Ammonium based Silane (QAS) precursor is designed. Three different QAS precursors were synthesized and characterized by its Amine value. A coating formulation based on Bis triethoxy silyl octane (BTEOS) and one of the synthesized QAS precursors was prepared and subsequently thin films were fabricated by the dip-coating technique using glass cover slips as substrates. Finally the coatings were tested in bacterial cultures of Escherichia coli to observe their antibacterial properties. It was experimentally demonstrated that these QAS based organic-inorganic hybrid films have a very good antimicrobial behavior against this type of bacteria.

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Poster: UV-curable non iso-cyanate polyurethane coatings	**Mohak Desai**	**3rd place**	Increasing environmental concerns as well as finite resources of petroleum products leads us to the green route of polymer synthesis and its application in coatings. The iso-cyanate derived from petrochemical products is not only environmentally hazards and toxic to human health but also difficult for handle, storage and use due to its high reactivity. In present work, we have synthesized UV curable polyurethane from non-iso cyanate route. We have prepared polyester glycerin carbonate (PEGC) and reacted with excess di-functional amine such as tri-methyl di-amine (TMD) which produces urethane linkage and free hydroxyl functional group (-OH) with amine (-NH2) end capping agent. This polyurethane further reacted with methacrylic anhydride to provide pendant and end capping acrylated functionality to the oligomer. We have also done molecular weight variation for PEGC as well as mole ratio of methacrylaic anhydride. The completion of different organic synthesis stages have been confirmed by amine value, acid value and/or FT-IR spectra. The testing and evaluation of cured film properties has been carried out by performing pencil hardness, pendulum hardness, solvent resistance, impact resistance test and cross cut adhesion test. The properties of coating concludes that this coating can be a good alternative where hardness with fast curing is required and UV curing is available.

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Research Title	**Student**	**Award**	**Abstract**
Poster: Study of Effect of Formulation Parameters on Opacity And Cost of Alkyd Based Architectural Coatings.	Palak Choudhary	Presenter	Rising cost of TiO_2 have pressurized Paint formulators to decrease formulation costs while finding balance between Cost and Performance (Opacity) of Paints. TiO_2 is an essential component in a white paint formulation due to its excellent light scattering property and is also the most expensive ingredient. In this study we explore the relationship between PVC, % Volume Solids & Opacity of the paint as a function of Cost. A standard formulation is used in which we varied PVC & % Volume Solids at different levels and studied their contribution on Opacity. The purpose of this study is to have a set of formulations with different PVC and % Volume Solids having the required Opacity which will help the formulators in deciding the formulation depending on the cost of TiO_2.
Poster: Cost-hiding study in Architectural Latex Paints	Riken Patel	Presenter	Titanium dioxide is the prime component in a coating formulation. It imparts opacity and being one of the most expensive ingredient formulators are asked to revisit their formulations in a way that desired opacity is achieved with minimum possible Rutile Loading. Among many parameters that influence Opacity, Pigment Volume Concentration (PVC) and Volume Solids are the most important as they influence the cost too. Latex paints with series of Volume Solids at different range of PVC are formulated and the Contrast Ratio for each set of formulation is measured. The cost for each Formualtion as well as cost to coat 1000 sq. Feet has also been calculated. This study shows potential as an ideal model for comparing Hiding vs. Cost at specific PVC and Volume Solid and can help to optimize the formulation in terms of Hiding, Cost and Titanium dioxide content.