

Thin film coatings for photovoltaic and moisture barrier applications

Dr.Dona Mathew,

Head, Polymers and Special Chemicals Division,
Polymers and Special Chemicals Group, PCM Entity,
Vikram Sarabhai Space Centre, ISRO, Trivandrum

Conventional lead- based perovskites are highly undesirable due to their limited environmental stability and toxicity. It is desirable to replace lead in conventional perovskites with more stable and benign systems, exhibiting comparable or superior photovoltaic performance. This is achieved through synthesis of stable, tin-based perovskites using an oligomer mediated route. The chemical, thermal, optical, morphological and photovoltaic characterization of the new material revealed an interesting, new class of materials having good environmental stability and promising features for optoelectronic applications. Influence of the oligomer on the environmental and thermal stability of Sn^{2+} based perovskites has been investigated. It is understood that, the oligomer can act as an excellent protective medium and prevents oxidation of Sn^{2+} perovskite without adversely altering its optical, morphological and thermal properties of the perovskite.

Super hydrophobic (SH) particles are very scarcely investigated to prepare super hydrophobic coatings. Database on simple & facile routes for realization of such SH coatings is limited. Super hydrophobic silica particles were realized using various chemical reactions on the surface. Incorporation of such SH particles in polymers resulted in SH coatings. A facile, one step reaction involving long alkyl chains resulted in melt-processable super hydrophobic silica coatings. The SH coatings thus developed are tolerant to extreme acidic and basic conditions (pH 1 and 13) and they displayed self-recoverable SH behaviour even after several series of thermal exposure tests. Morphology of the structure is also regained on self-recovery. Macro-crack healable, chemically durable, bulk super hydrophobic material with self-cleaning and self-regenerating features and mechanically resistant and sprayable SH coatings are also demonstrated.

Biodata:

- M.Sc in Applied Chemistry : Cochin University of Science and Technology in 1993
- Ph.D in Chemistry on the topic 'Cyanato functional polymers: Synthesis, characterization and application in composites' from University of Kerala (in 1999) under the joint guidance of Dr.K.N.Ninan and Dr.C.P.Reghunadhan Nair.
- Post-Doctoral Associate with Prof.Yves Gnanou at LCPO, University of Bordeaux, France from 2000-2001
- Joined VSSC/ISRO in 2001.

Areas of interest	<ol style="list-style-type: none">1. High performance polymers and advanced composites2. Design of novel polymers and polymerization techniques3. Light weight thermal protection systems4. Nano photovoltaics5. Super hydrophobic materials and allied systems6. Specialty materials, adhesives, coatings, primers and potting compounds7. Specialty materials for interplanetary missions
Positions held	<ul style="list-style-type: none">• Project Manager-Space Capsule recovery experiment-2010• Human Space Flight Project -2016• Deputy Project Director, Chandrayaan 2 and 3- 2021• Deputy Project Director, Gaganyaan -2021

International Journal Publications: Patents Books/Book Chapters Awards Supervision of Ph.D Thesis	<ul style="list-style-type: none">• 55• 16• 5• ISRO Team Award, Best Poster awards-5• 5 nos
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