

Thursday, 2nd March 2023

## Session III: High Performance Pigments

### Speciality pigments



**Dr Tipanna Mariyappa**

Consultant

Dr Tipanna Mariyappa obtained his B.Sc. (Tech.), M.Sc. (Tech.) and Ph.D. (Tech.) degrees in polymer technology from UDCT (now ICT) in 1993, 1997 and 2000 respectively.

Dr. Mariyappa joined M/s Aron Universal Ltd., a fluorescent pigment manufacturing company as Sr R&D Manager. In 2002, he moved to Nirlon Ltd as Head, R & D. He then worked for M/s Tytan Organics Pvt Ltd as R&D and QA Manager before venturing into his own company, M/s Macrotech Polychem Pvt Ltd in 2004. He implemented various projects, such as manufacturing of nylon 6, pearlescent pigments and speciality plasticizers. He started another proprietary company, M/s Chemtip Laboratories, in the same year. In this custom R&D unit, Dr Tipanna developed various speciality products that were then imported. These were subsequently commercialised.

Dr Tipanna has more than 28 years of academic as well as industrial experience in the field of plastics, pigments and coatings. He has hand on experience in dealing with effluent coming from pigments and allied industries. Presently, he is involved in the manufacture of speciality chemicals (additives for plastics). He is a free-lance consultant to many organisations and a visiting faculty at various educational institutes, including ICT.

Dr Tipanna is Past President of the Colour Society and has actively organised various lectures and conferences. He is a member of Board of Governors (BOG) of UDCT Alumni Association since a few years and is currently the Treasurer.



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### Abstract

Specialty pigments offer certain special effects such as glow, interference, brightness etc. These are costly and consumed in less quantity. Despite their limited use, these pigments bring unique effects to plastics/paints/inks/textiles and personal care products, making them an important class of colour additives for the decorative cosmetic industry. Each specialty pigment has a specific attribute that makes it stand out when compared to regular pigments.

Effect pigments exhibit special effects on various substrates in order to enhance quality and to make them comparatively attractive to consumers. These pigments display a wide range of properties such as colour-travel, light reflection or refraction and act as mirrors (metal flakes). These also display iridescence, a multiple colour effect. A pearlescent pigment is obtained by coating a metal oxide having a high refractive index on the laminar substrate such as mica. The resulting pigment is semitransparent, and has some unique optical properties. The effect observed is similar to pearl and hence the term pearlescent. Characteristics of these pigments are metal like luster and iridescence.

Luminescent pigments are materials that emit light (visible, IR or UV) upon suitable excitation, without becoming incandescent. Fluorescent pigments and phosphorescence pigments are luminescent pigments based on the phenomenon of photoluminescence which involves absorption of energy and excitation of an atom to a higher energy level followed by electromagnetic radiation (return to ground state). In both phenomena, the emitted photon has a lower energy than the absorbed photon and so emission occurs at longer wavelength than incident light.

Fluorescent pigments absorb at low wavelength (high energy) such as UV, visible and emit at a higher wavelength (lower energy) of deeper colours. These pigments are solid solution in a polymer matrix. They are bright, intensely coloured and glow in day light. Hence, these are also called day light fluorescent pigments

Phosphorescent pigments are materials that do not immediately re-emit the absorbed radiation, rather it is re-emitted at a lower intensity for up to several hours after the original excitation. Such pigments are therefore also termed as glow-in-the-dark pigments.

Other specialty pigments are thermochromics pigments, photochromic pigments, metal flakes and complex coloured inorganic pigments (CICP), also called mixed metal oxide (MMO) pigments.