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Session II: Functional Colorants - I

Some unique applications of NIR dyes



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Dr Debasis Bhattacharya earned his Ph.D. from National Chemical Laboratory, Pune in 1996 and proceeded to University of Cape Town, South Africa for pursuing postdoctoral research. He joined Vanavil Dyes and Chemicals, Cuddalore, Tamil Nadu as Manager Product Development on his return in March 2000. He moved to TechNova Imaging Systems Pvt Ltd, Taloja in January 2004 where, as Sr. General Manager – R & D (Plates), he currently leads a team responsible for developing processes for the manufacture of resins, binders, polymers, sensitizers and surfactants all the way from concept to commercialization. He is in charge of designing and developing emulsions for screen printing and UV coatings for printed circuit boards.

Dr Bhattacharya is also responsible for providing technical support to in-house manufacturing plants in graining and anodizing process during aluminium coil processing and to customers in the printing industry. He is the author of 15 papers published in international journals and one patent.

Abstract

The presentation will highlight the use of NIR dyes in the niche area of printing, a relatively unknown feature of functional dyes.

NIR fluorescent imaging offers a considerable advantage over imaging in the visible range owing to its excellent sensitivity and temporal resolution. Historically, red to NIR-absorbing chromophores were developed for applications such as textile dyeing, photocopying and laser printing. Optical imaging in the NIR window is now applied to organic lasers, panchromatic photosensitizers and PDT photosensitizer probes for bioimaging.

Digital exposure has been used to image a lithographic pattern in offset printing by using a water-in-oil emulsion of oleophilic printing ink and dampening fountain solution in the press. The hydrophilic Al₂O₃-layer functions as the water accepting (non-printing) part while the hydrophobic coating accepts the oleophilic ink thereby differentiating between printing (image) and non-printing (non-image) areas on exposing and processing.

Physical drying is often used to remove water/solvents from the substrate of the printed material. This is important particularly for printing businesses whose customers demand immediate delivery of printed material. The recently introduced laser-drying method incorporates a dye that absorbs in the NIR range and immediately releases heat in the printed layer resulting in the removal of water/solvents with no thermal destruction of the substrate.

Present research is focused on developing “processless” lithographic plates, i.e. without the need of any processing hardware and chemistry wherein the non-image is cleaned out on the press itself. This concept is based on NIR sensitized cationic and hybrid radical / cationic polymerization for crosslinking.