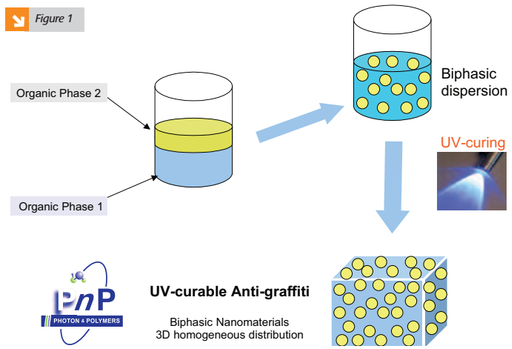
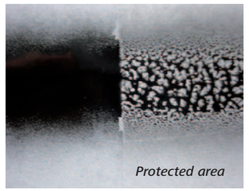
CUSTOMISED FORMULATION TO MEET SPECIALIZED REQUIREMENTS

FOR UV-CURING NANO-BIPHASIC ANTI-GRAFFITI & DROP-JET MANUFACTURING

PHOTON & POLYMERS (PNP) IS A SPIN-OFF FROM FRANCE'S UNIVERSITY OF HAUTE ALSACE, IN MULHOUSE IN EASTERN FRANCE CLOSE TO THE SWISS AND GERMAN BORDERS, AND FRENCH RESEARCH AGENCY, THE NATIONAL CENTRE FOR SCIENTIFIC RESEARCH (CNRS).CREATED BY DR KHALID ZAHOUILY, WHO HAS A PHD IN PHOTOCHEMISTRY AND PHOTOPOLYMERS, IN 2001, THE COMPANY SPECIALISES IN THE RESEARCH AND DEVELOPMENT OF PHOTOPOLYMERS MATERIALS THROUGH THE TECHNICAL FEASIBILITY STAGE, CONCENTRATING ON PHOTOPOLYMERS MATERIALS AND CUSTOM SOLUTIONS IN UV-CURABLE HIGH PERFORMANCE COATINGS.

Figure 1




Protected area

markets include the most prestigious companies in the luxury, automotive, electronics, optics and surface treatments including medical applications. A highly competitive group of scientists and engineers are led by Professor Christian Decker, director of research at CNRS, Professor Gerard Riess, head of the polymer department at the University of Haute Alsace, and Dr Khalid Zahouily (UV-Curing expert).

the company's environmentally friendly technology has found a large variety of industrial applications. UV-radiation curing is increasingly used in the coatings industry for the surface protection of various materials (wood, paper, plastics and metals) by fast-drying varnishes or paints, as well as to produce quick-setting adhesives, sealants, composite and nanocomposite materials, Without forgetting the very promising market in UV-curable inkjet.

PnP's UV-cured coatings are designed to improve the weathering resistance of different kinds of organic materials, as well as substantially enhance surface properties such as gloss, abrasion, scratch Anti-graffiti and chemical resistance.

PnP has also developed a crosslinked UV-curable high performance nanocomposite by using photoinitiated polymerisation of multifunctional monomers and oligomers, and mineral nanoparticles (such as colloidal silica, organic or carbon nanotubes). These nanocomposites are used to create high performance clear coatings for such purposes as:

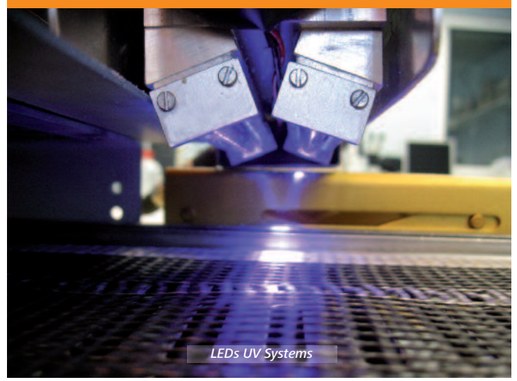
- A new route for the synthesis of biphasic organic nanocomposite alloys and colloidal polymer systems;
- Biphasic polymer structures, which will include organic nanoparticles and/or minerals, are being used by PnP to develop materials with extraordinary anti-graffiti properties.

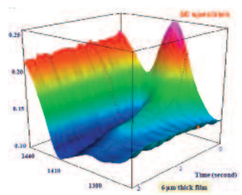
This new biphasic oil/oil nanomaterials concept makes this new generation of UV curable anti-graffiti coatings regenerable, compared to conventional anti-graffiti coatings, which, under the action of abrasion effect, lost their anti-graffiti properties after a few months.

Kinetics studies of photopolymerization reaction by using Real Time FT-IR Spectroscopy

UV-Curing Process

Light-induced polymerisation of multifunctional monomers, is commonly recognised as the most effective process to transform a solvent-free liquid resin into a highly resistant polymer material rapidly at ambient temperature. Under intense illumination, the crosslinking reaction proceeds extensively at ambient temperature to generate a dense, three-dimensional polymer network showing excellent resistance to organic solvents, chemicals and heat. Because of its distinct advantages regarding processing and product performance, this environment-friendly technology has found a wide range of industrial applications, in particular to achieve fast drying of varnishes and printing inks, and quick setting of adhesives and composite materials. This technology was found to be very effective to produce biphasic nanocomposite materials or coatings based on acrylic resins and nanoparticles, which exhibit an excellent resistance to scratching, abrasion and anti-graffiti properties. The short processing time and the low energy consumption make the UV-curing technology particularly attractive in terms of cost, compared to the conventional thermal curing process


LEDs UV Systems


3D profile of photopolymerization reaction

UV curable antigraffiti coatings based on biphasic nanocomposites made of either Acrylate resin with vinyl resin and /or UV curable Sol-Gel have been produced rapidly at ambient temperature by simple exposure to UV radiation. This UV-curing technology clearly outperforms traditional thermal processing with respect to output, cost, product quality and environmental impact.
This Biphasic technique makes it possible to obtain UV curable anti-graffiti coatings for train and Railway applications whose performances are perennial in the time, without sacrificing the abrasion and weathering resistance properties.
Conscious of the problems of body (Train and Railway) repair, PnP was able to tailor the Photochemical responsiveness of its biphasic Uv curable formulations with the new generation of LED systems.

Moreover, specific Areas of development in High performance coatings and nanocomposites include:

latex magnetic cores using ferrite and steerable structures under a magnetic field,
conductive polymers, coatings and/or inkjet inks based on (PbTiO3, BiMnO3, BiCrO3, P2O5 ...) in the form of nanoparticles dispersed in a matrix by photochemically polymerisable coatings.

DROP-JET MANUFACTURING

The company has also found opportunities in the fast growing market for UV-curable inkjet inks for wide format printers, Industrial customization and also new industrial applications (like 3d printing), which incorporate surface functionalization using DoD inkjet technology. PnP is developing tailored solutions for inkjet inks based on UV hybrid systems.
Cationic systems and dual-cure inkjet inks for glass applications are being developed by PnP. At the same time, PnP is exploring the usefulness of UV-cured latex and biphasic organic nanocomposites as a way to meet specialized requirements in very flexible UV inkjet (for Leather and plasticized PVC applications)■

MORE INFORMATION

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