Performance Coatings International Laboratories, LLC

Recent Developments in Coatings for Plastics

PERFORMANCE COATINGS INTERNATIONAL LABORATORIES

Innovative Coatings Through Research

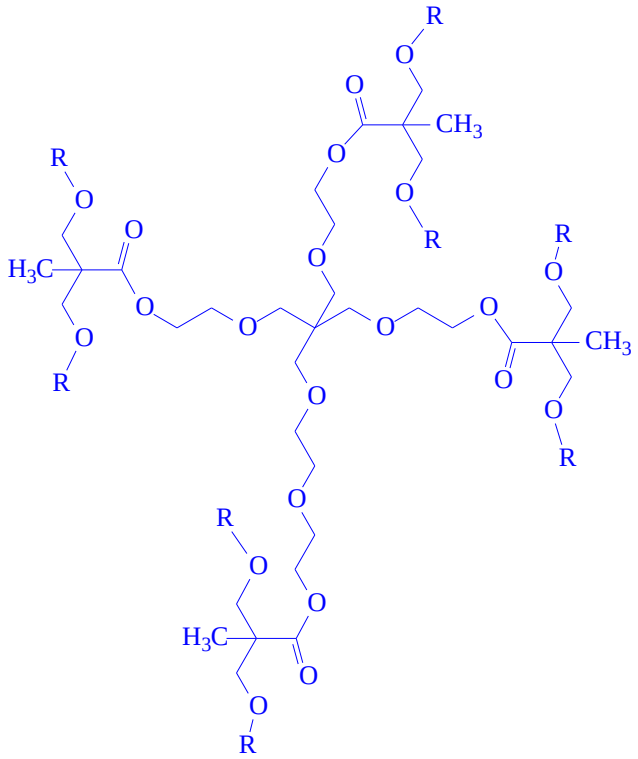
R&D Developments & Activities

- Abrasion Resistant Coatings
- Anti-fog Coatings
- Anti-Fingerprint Coatings
- Weatherable Coatings

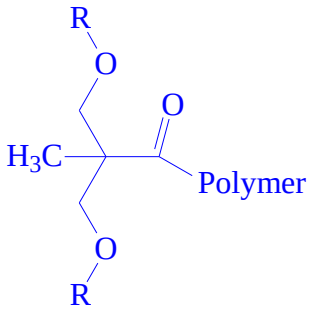
Abrasion Resistant Coatings

- Application of acrylates of high functionality. Usually the maximum functionality (f) of acrylate oligomers is f=6. We use higher $f > 6$
- Use of colorless inorganic microparticles for further improvement of scratch resistance
- Employment of surface modifiers that enhance mar and abrasion resistance
- Selection of Photoinitiators system that allow maximum oligomer and monomers conversion
- Utilize one or several UV sources for optimum polymerization

Dendritic Acrylates,
Proprietary 15-functional Urethane Acryalte



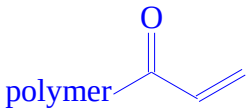
Where R can be:



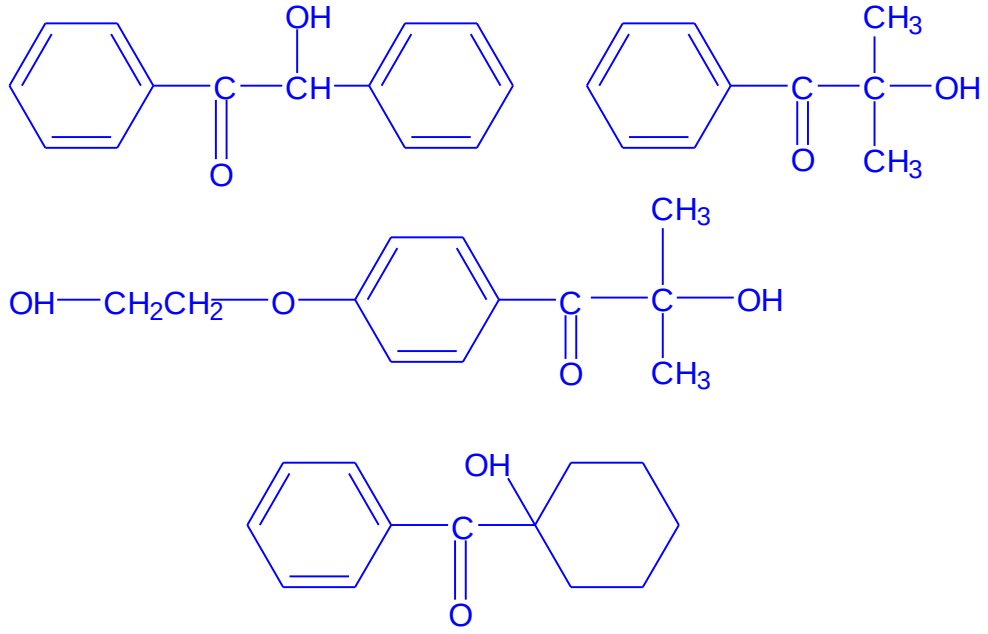
Or

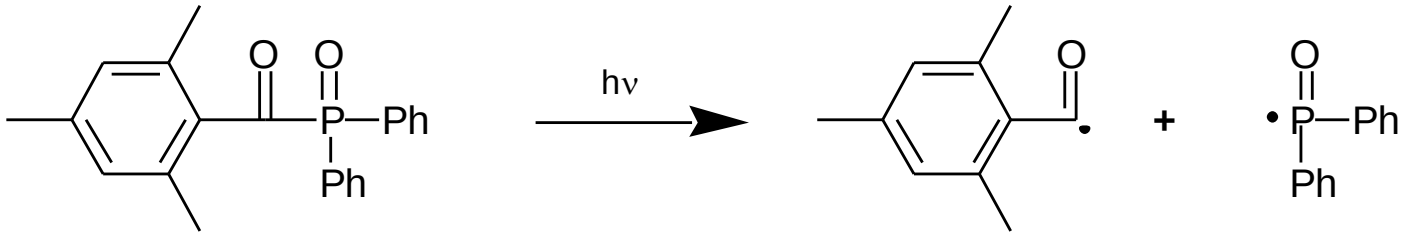
H— Polymer

Or



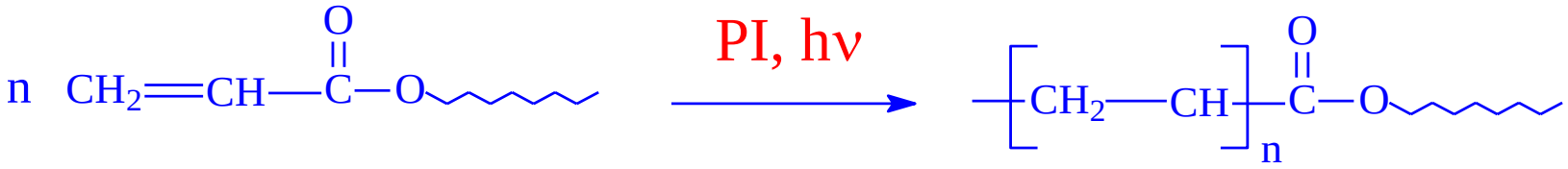
Photoinitiators (PI)





1a **1b** **1c**

Photocure

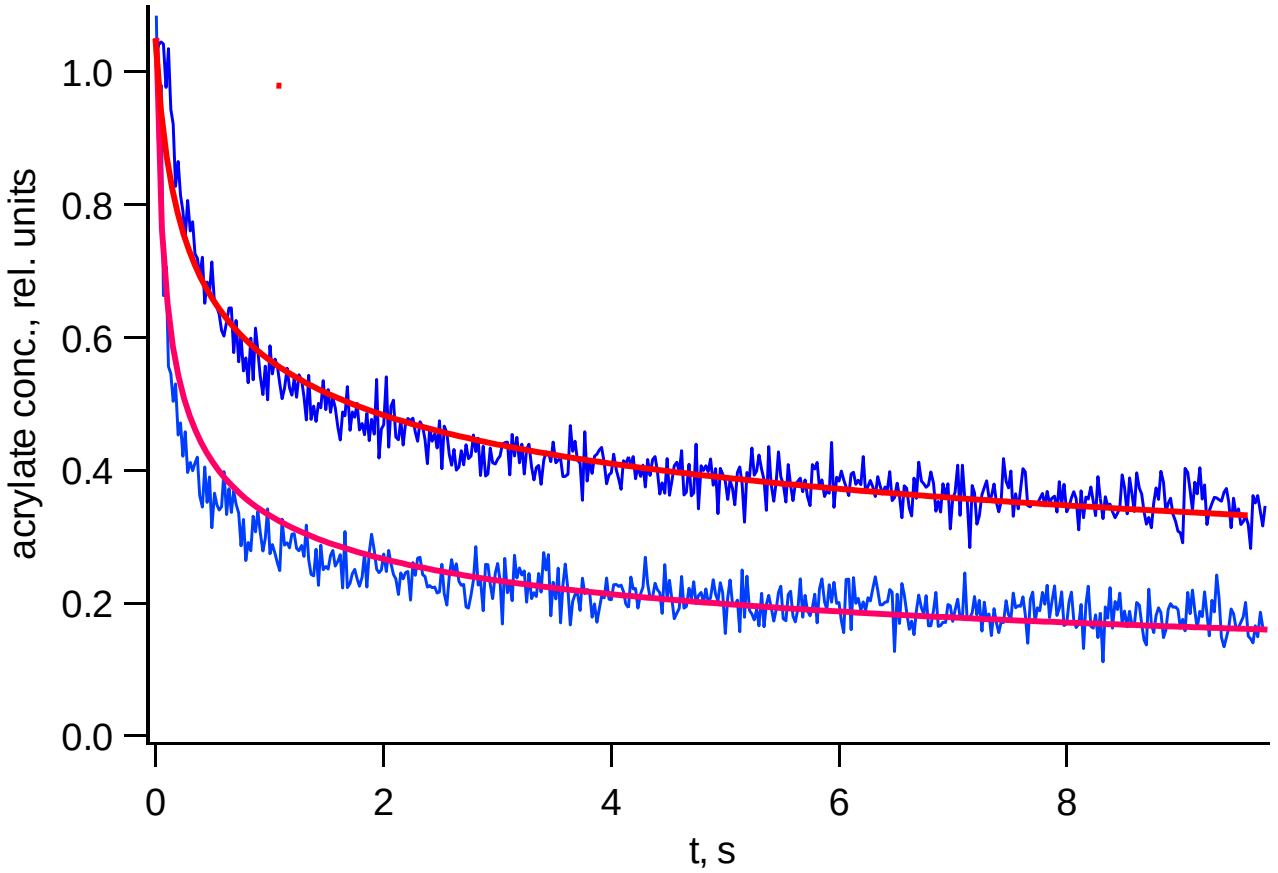


Multifunctional acrylates

(Cured) polymer

Cured multifunctional acrylates form cross-linked 3D structure that has high shrinkage

Kinetics of Cure:PCI coating 801 HC (different light intensities)



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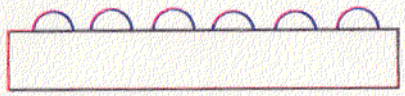
Anti-Fingerprint Coatings

Experimental formulations using

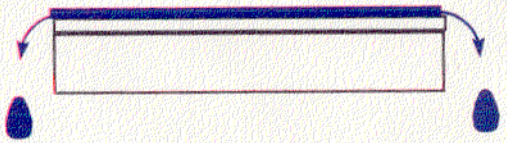
- Fluroalkyl Silanes
- Perfluroalkyl Silanes
- Nanoparticle Silica
- Water Contact Angle(deg):>110
- Increased rubbing durability

400nm 500nm 600nm 700nm 750nm

Antifog Coating of PCI



Transparent surface, which fogs in the humid atmosphere, and vision through the surface is hindered.

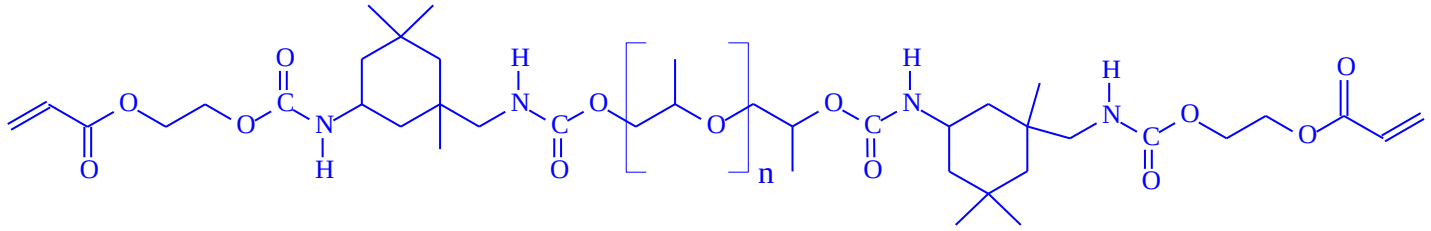


Surface with permanent anti-fog coating. Coating is hydrophilic, i.e., it attracts water molecules and causes moisture to spread evenly over the coated surface. The excessive amount of water evaporates or slides off the surface.

The anti-fog coating enhances visibility, eliminates the need for films and temporary anti-fog towelettes, cloths, and solutions. The coating is used where fogging is undesirable (goggles, safety glasses, agricultural and food-packing films, etc.)

Hydrophilic Coating Based on Urethane Acrylates

Hydrophilic coating should have ethylene oxide (EO) fragments in polyol: -(CH2 CH2O)n-



Example of a di-functional urethane acrylate

PCI uses proprietary multifunctional urethane acrylates that offer excellent anti-fogging properties

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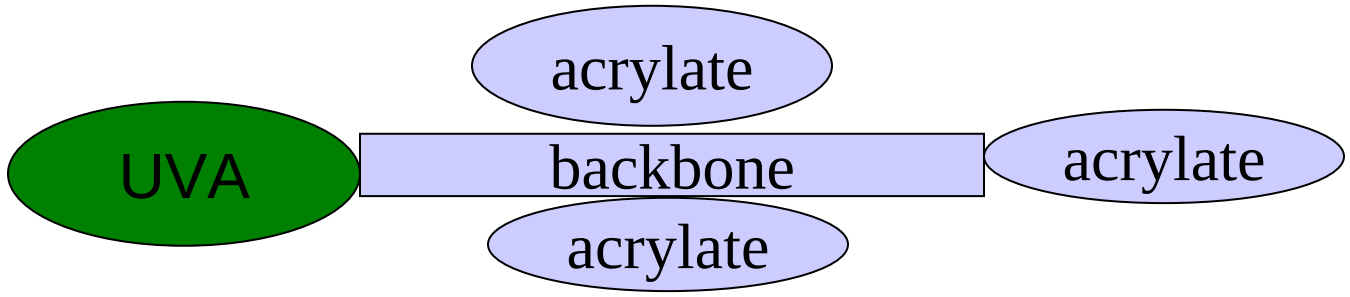
Weatherable Coatings

Sunlight is an important cause of damage to plastics and other organic materials, and short wavelength UV is responsible for most of this damage. Coating exposed to outdoor use are subjected to especially harsh weathering conditions like UV light, oxygen, moisture, and other pollutants. The possible approach to stabilize coating for such conditions can be usage of stabilizer whose filter effect protects the substrate against color change and photochemical degradation.

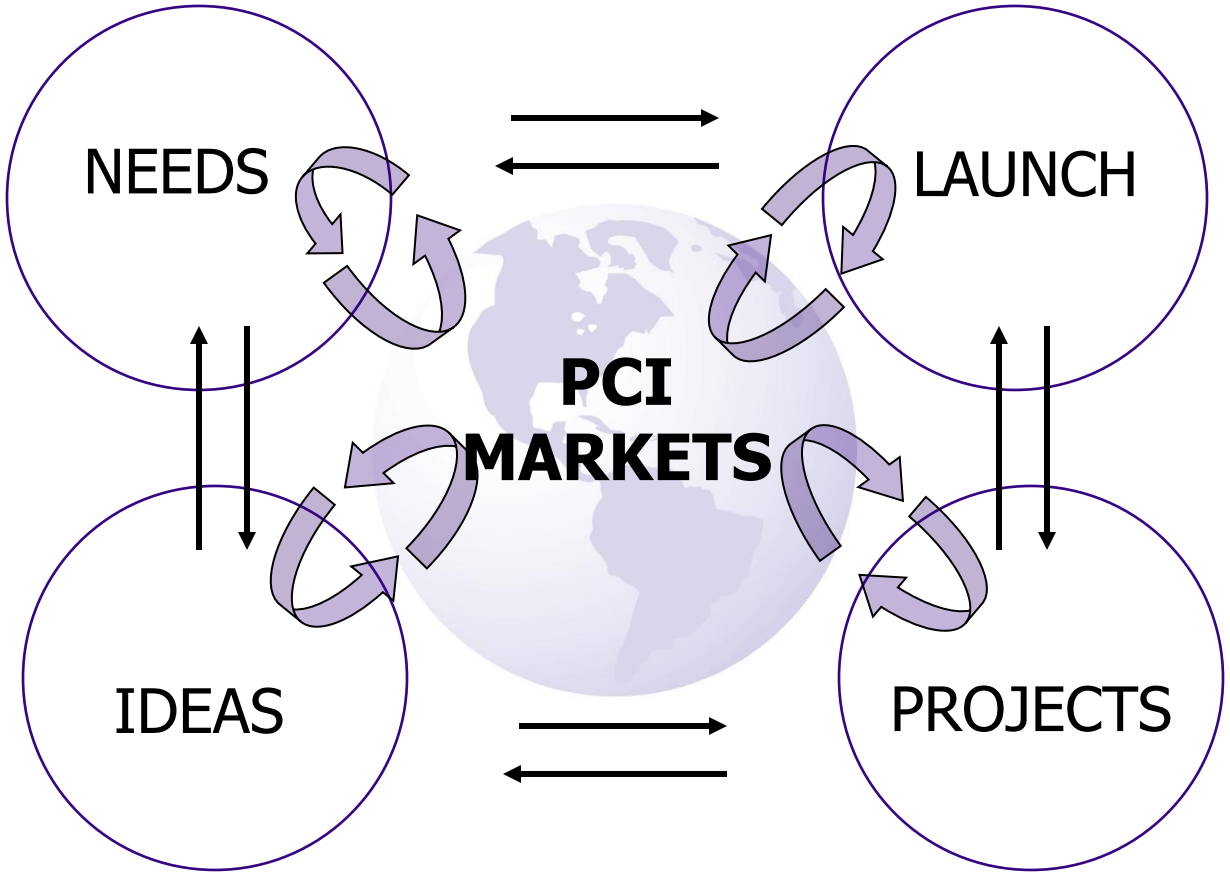
Weatherable Coating of PCI

- Based on multifunctional urethane acrylates
- Added antioxidants and UV stabilizers
- The main oligomer has a grafted PCI's proprietary UV- absorber (UVA) package



400nm 500nm 600nm 700nm 750nm

Innovation Process



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