

### THE OPPORTUNITY

New nitroxides have been developed for cost-effective application to controlled free radical polymerization (CFRP) processes. Noveon, Inc. is now making this technology available for purchase.

Piperazinone- and morpholone-based nitroxides and their adducts patented by Noveon scientists provide superior polymerization rates in a range of materials.

### MARKET APPLICATIONS

For both end-functional and block copolymers, this technology enables improved properties across a range of potential applications, including:

- Waterborne polyurethane dispersions and thermoplastic polyurethane resins – Heat/UV resistance, hydrolytic stability, improved adhesion.
- Powder coatings – High-temperature properties; flow and cure properties.
- Pressure-sensitive adhesives – flow properties; adhesive/cohesive strength, UV/heat resistance.
- Textile binders/adhesives (upholstery and flock) – Adhesive strength, chemical resistance.
- Film-to-film laminating & contact adhesives – Adhesion to a variety of substrates; heat resistance.
- Pigment printing binders, pigment dispersants – Adhesive strength, flow, chemical resistance.

### THE TECHNOLOGY

CFRP is a process-oriented technology that facilitates the preparation of linear or branched polymers having narrow molecular weight distributions and reactive end groups on each polymer chain. The process can also produce block copolymers having unique properties. Process conditions allow high (essentially 100%) conversions at reasonable process temperatures (less than 130 degrees Celsius).

The Noveon process is ideal for producing acrylates, methacrylates, styrenes, and dienes. Noveon nitroxides are particularly suited to emulsion or microsuspension polymerization.

### BENEFITS

Advantages of morpholone- and piperazinone-based nitroxyl radicals and adducts include:

- Both nitroxides and their adducts are easy to handle crystalline materials with good shelf life.
- Chemical structure of the nitroxides can be easily modified to provide optimum hydrophilic/hydrophobic balance.
- Radicals are prepared by simple, high-yield process using readily available, low-cost starting materials.
- Morpholones and piperazinones can be converted to their nitroxyl radicals using well-known oxidation methods.
- Noveon nitroxides provide better control and higher conversion of acrylic monomers compared to TEMPO-mediated reactions.
- Unlike TEMPO and its derivatives, these radicals enable controlled synthesis of acrylate homo- and block-copolymers with narrow polydispersities.

Adducts derived from these radicals, in combination with a suitable initiator for SFRP, are also effective in the controlled synthesis of acrylate homo- and block-copolymers – and they are simple to prepare.

### INTELLECTUAL PROPERTY

The technology is protected by US Patent **6,281,311** and equivalents in 17 countries. The patent, which originates to Priority Application 08/828,991, was filed on March 31, 1997, and features 93 Claims; six are independent claims. *Click here to access the full-text*

### ADDITIONAL INFORMATION

First Principals, Inc. is representing Noveon in identifying appropriate organizations that seek to acquire this technology. For additional information, contact:

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