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## Free radical polymerization of acrylic monomers from plant oils

**Andriy Voronov**

North Dakota State University, USA

Most currently available synthesis of polymers from plant oils are limited to polycondensation and oxypolymerization. Both mechanisms result in formation of exclusively cross-linked polymers, widely applicable in industrial coatings. Because of highly hydrophobic nature of triglyceride molecules, the development of waterborne polymeric materials (in particular, latexes) from plant oils has been challenging. One-step method converts fatty acid esters of vegetable oils into bio-based acrylic monomers for free radical polymerization. While the vinyl bond of these monomers is reactive in conventional addition chain polymerization and facilitates macromolecular chain growth, the double bonds of the fatty acid chains are unaffected during the free radical polymerization. Currently exemplified for soybean, linseed, sunflower and olive oil (possessing remarkably different compositions of fatty acids in triglycerides) monomers can be applied in the production of latexes that utilize acrylic monomers and polymers. The plant oil-based monomers offer unique functionality due to nature of double bonds, which allows forming linear macromolecules as well as “on-demand” cross-linking, and provides an ability to tune final material properties, including hydrophobicity. The reactivity ratios of the synthesized monomers in free radical copolymerization with petroleum-based counterparts, as well as their  $Q-e$  parameters, indicate that new monomers behave in copolymerization as conventional vinyl monomers. The resulting copolymers are capable of post-polymerization oxidative reactions to form cross-linked polymer structures, or of modification of unsaturated fatty acid chains. Specifically, degree of unsaturation in fatty acids are utilized as a criterion for comparing monomers behavior in addition chain polymerization and copolymerization to yield biobased polymer latexes.

### Biography

Andriy Voronov has completed his academic education in Ukraine, an MS in Chemical Engineering in 1990 and a PhD in Polymer Chemistry from Lviv Polytechnic National University in 1994. He received tenure and was promoted to Associate Professor at Coatings and Polymeric Materials in 2013. He was an Alexander von Humboldt Research Fellow at the University of Bayreuth, Germany, Visiting Scientist at Vienna University of Technology in Austria, Visiting Fellow at the University of Ulm, Germany and Institute Charles Sadron, CNRS, Strasbourg, France. He has published more than 90 articles, 8 book chapters and has filed 7 patents/patent applications.

andriy.voronov@ndsu.edu

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