NEW NANOSTRUCTURED FUNCTIONAL MATERIALS FOR COATINGS BY ATRP WITH PPM AMOUNTS COPPER

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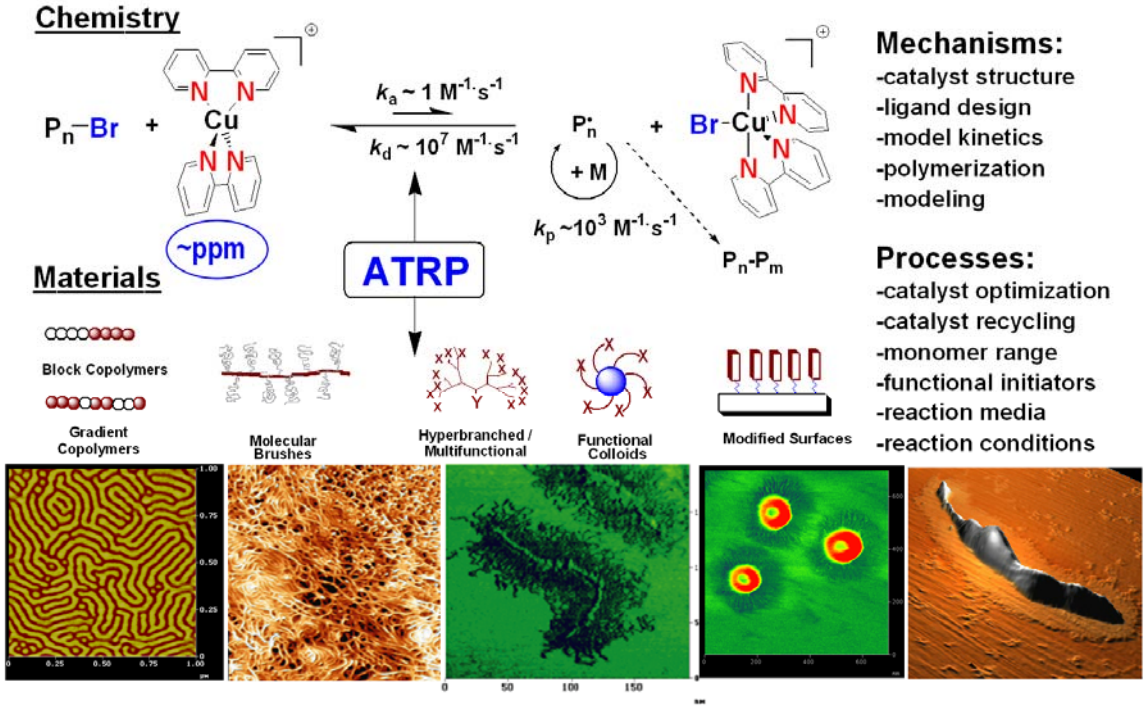
Copper-based ATRP (atom transfer radical polymerization) catalytic systems with polydentate nitrogen ligands such as bpy and aliphatic polyamines is among most efficient controlled/living radical polymerization systems (CRP).[1,2] New ATRP initiating systems allow to decrease level of Cu-catalyst to a few ppm with preserved control.[3]

ATRP of (meth)acrylates, styrenes, acrylamides, acrylonitrile and other vinyl monomers provides polymers with low polydispersities and molecular weights in a range $200>M_n>20{,}000{,}000$. Polymers can be formed quantitatively in bulk, in solution and in emulsions. Block, graft, star, gradient, hyperbranched copolymers, as well as gels and networks.[2] The (co)polymers made by ATRP have many potential applications as components of coatings, elastomers, adhesives, surfactants, dispersants, lubricants, additives, but also as specialty materials in biomedical and electronic areas and will affect the market of ~$20 billion/year.[4] Examples of design, synthesis, characterization and applications of nanostructured multicomponent polymeric materials enabled by ATRP will be presented with a special emphasis on coatings.



$$:NSF, DoE, EPA, DARPA, & ATRP/CRP Consortia: *Akzo, Arkema, Asahi, Atofina, ATRP Solutions, Bayer, BFGoodrich, Boston Scientific, BYK, Cabot, Ciba, Ciba Vision, CIP, Dainippon Ink, Degussa, Dionex, DSM, Elf, Encapson, Evonik, GE, Geon, GIRSA, HTIG, JSR, Kaneka, Lion, Mitsubishi, Mitsui, Motorola, 3M, Nalco, Nippon Goshei, Nitto Denko, PPG, Rohm & Haas, Rohmax, Sasol, Solvay, Teijin, WEP & Zeon*

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