

# Surfactant-Free *Ab Initio* emulsion polymerization of vinyl acetate using a dextran-based xanthate agent synthesized by click chemistry

Maud Save,<sup>1,2</sup> Julien Bernard,<sup>3</sup> Benoit Arathoon,<sup>1</sup> Bernadette Charleux<sup>1</sup>

<sup>1</sup> Laboratoire de Chimie des Polymères, UMR 7610, Université Pierre et Marie Curie - CNRS, 4 place Jussieu, 75252 PARIS Cedex 05, France

<sup>2</sup> IPREM Equipe Physique et Chimie des Polymères, UMR 5254, Université de Pau et des Pays de l'Adour - CNRS, Technopole Hélioparc, 2 Av Président Angot, 64053 PAU cedex 9, France

<sup>3</sup> Ingénierie des Matériaux Polymères / Laboratoire des Matériaux Macromoléculaires (IMP / LMM), Université - INSA Lyon, CNRS-UMR 5223, Villeurbanne, 69621, France

## Abstract

Stable poly(vinyl acetate) (PVAc) submicronic latex particles are synthesized by *ab initio* batch emulsion polymerization using a dextran derivative as an efficient steric stabilizer. The dextran end-functionalized by a xanthate moiety is synthesized by Huisgen's 1,3-dipolar cycloaddition ("click chemistry"). It is then applied as a macromolecular RAFT (Reversible Addition Fragmentation chain Transfer) agent in surfactant-free emulsion polymerization of VAc to form in-situ an amphiphilic block copolymer able to efficiently stabilize the latex particles. The method affords the preparation of high solids content (27 %) latexes with stable monodisperse PVAc nanoparticles (average  $D_p < 200$  nm) coated by a polysaccharide shell. Only a low amount (2 – 6 wt % of Dext-CTA vs. VAc) of the efficient stabilizer precursor coming from biomass is required. In comparison, the latex stabilized by either native dextran exhibits poor colloidal characteristics. The clear improvement of the latex properties observed when only 31 % of the dextran chains are functionalized by a xanthate moiety shows the real interest of the proposed strategy to elaborate well-defined dextran-decorated PVAc nanoparticles. Both the kinetic study and the molar mass analyses confirmed the involvement of the dithiocarbonate group in the emulsion polymerization process.

