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Phase inversion, formation and stability mechanism of poly  
(urethane-acrylate) nanoemulsions based on block-copolymer surfmer

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**Abstract:** We reported herein the synthesis of block copolymers and their application in the in-situ emulsion polymerization of waterborne poly (urethane-acrylate) (WPUA) nanoemulsions based on phase inversion process. The polymerizable surfmers containing terminal unsaturated double bonds (MSA-r) were successfully synthesized via catalytic chain transfer polymerization (CCTP). Random copolymer (MSA-t) prepared through radical polymerization was utilized as control. The structure, surface tension and aggregation behavior of surfmers were characterized. The phase inversion, formation and stability of WPUA nanoemulsions were systematically investigated. Effects of MSA-r surfmer content and BMA/MMA ratio on the water resistance and thermal stability of the corresponding films were also discussed. It was found that the phase inversion mechanism of PUA prepolymer in the presence of MSA-r surfmers is

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