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Robust, Self-healing, Superhydrophobic Coatings Highlighted by a Novel Branched Thiol-ene Fluorinated Siloxane Nanocomposites

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KEYWORDS: Superhydrophobic, Thiol-ene, Interpenetrating polymer networks (IPN), Self-healing

ABSTRACT: In this work, we present one-step dip-coating strategy for fabricating robust, self-healing and superhydrophobic coatings using a coating solution that contains a novel branched thiol-ene fluorinated siloxane (T-FAS), polydimethylsiloxane (PDMS) elastomer and hydrophobic fumed silica nanoparticles (SiO_2 NPs). The novel branched T-FAS, with low fluorinated surface energy and high sol-gel reactivity, was prepared by introducing (N-methyl-perfluorohexane-1-sulfonamide) ethyl acrylate (FSA) and γ-methacryloxypropyltrimethoxysilane (MPS) into pentaerythritol tetra (3-mercaptopropionate) (PETMP) via thiol-ene click reaction. The superhydrophobic coating, being high stable to strong acid, UV, thermal and smudge treatment, has a water contact angle of 165 ± 2 ° and shedding angle of 4 ± 1 °. It can withstand