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Molecular Velcro constructed from polymer loop brushes showing enhanced adhesion force TIAN ZHOU, BIAO HAN, LIN HAN, CHRISTOPHER LI, Drexel University, DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING TEAM, SCHOOL OF BIOMEDICAL ENGINEERING, SCIENCE AND HEALTH SYSTEMS TEAM — Molecular Velcro is commonly seen in biological systems as the formation of strong physical entanglement at molecular scale could induce strong adhesion, which is crucial to many biological processes. To mimic this structure, we designed, and fabricated polymer loop brushes using polymer single crystals with desired surface functionality and controlled chain folding. Compared with reported loop brushes fabricated using triblock copolymers, the present loop bushes have precise loop sizes, loop grafting density, and well controlled tethering locations on the solid surface. Atomic force microscopy-based force spectroscopy measurements using a polymer chain coated probe reveal that the adhesion force are significantly enhanced on the loop brush surface as compared with its single-strand counterpart. This study directly shows the effect of polymer brush conformation on their properties, and suggests a promising strategy for advanced polymer surface design.

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