Grafting of multifunctional polymer brushes from a glass surface *via* surface-initiated atom transfer radical polymerization

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Modification of organic or inorganic surfaces by grafting polymer brushes has been extensively studied in recent years, because those intelligent surfaces provide lots of useful functions [1]. Among various grafting methods, surface-initiated atom transfer radical polymerization (SI-ATRP) is one of the most promising techniques to fabricate well-defined polymer brushes on surfaces. It allows the production of surface-tethered coatings characterized by controlled composition and predetermined thickness. Additionally, SI-ATRP can be carried out in an aqueous environment combining ecological aspects with a rapid rate of polymerization resulting in µ-range thicknesses [2].

Poly(*N,N*-dimethylaminoethyl methacrylate) (PDMAEMA) cationic brushes are often building blocks for the creation of smart materials, because of their miscellaneous physicochemical characteristics, including sensitivity to light, pH, and temperature. Furthermore, the tertiary amine groups found in the PDMAEMA structure can be quaternized to receive bactericidal and antifouling materials [1]. In this contribution, we developed a facile, economical, and environmentally-friendly procedure for controlled grafting of PDMAEMA brushes from glass surfaces, both in mL and µL scale, utilizing aqueous solutions of sunflower honey as a source of reducing sugars and accelerator for activators regenerated by electron transfer (ARGET) ATRP of DMAEMA [3]. The resulting materials can serve as glass with multifunctional surfaces for various purposes. Kinetics investigation of DMAEMA polymerization in solution was followed by proton nuclear magnetic resonance (^{1}H NMR) and gel permeation chromatography (GPC). Atomic force microscopy (AFM) measurements were performed to investigate polymeric brush layer thickness. Elemental composition was also tested using scanning electron microscopy with time of flight secondary ion mass spectrometry (ToF-SIMS).

Fig. 1. The multifunctional properties of glass-*g*-PDMAEMA materials.

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