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Do cationic polymer coatings retain their biocidal activity after washing with water?

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A. PDADMAC with an average molecular weight Mw = 470 kDa (CPS Chem. Com. Inc.) and PANa with Mw = 100 kDa (Sigma-Aldrich) were dissolved in a 10^{-3} M Tris buffer with pH 7. Concentrations of polymers were expressed in moles of quaternary amino PDADMAC groups [+] and carboxylic PANa groups [-] per liter.

IPCs were prepared by mixing of the PDADMAC and PANa solutions so that the molar ratio Z = [+]/[-] = 0.2 (IPC-0.2) and 0.4 (IPC-0.4). An excess of PDAMAC ensured the overall positive charge in both IPCs and their stability against aggregation in aqueous solutions at least within a month after IPC dispersion preparation. The IPC formation was carried out in the pH 7 buffer solution, additionally contained 10^{-2} M NaCl, for equilibrium distribution of PANa chains between PDADMAC chains [S1, S2].

B. The coatings were fabricated using 0.12 wt% solutions of PDADMAC, IPC-0.2 and IPC-0.4. 1.5 mL of each solution were deposited onto a 20 cm^2 glass slide (Thermo FS Menzel, Germany), pre-treated as described in [S3], so as to cover the entire surface. The samples were dried to a constant weight in air at room temperature and a 32±3% humidity (typically within 2 days), which was recalculated to a weight of dried polymer film. After that, 1.5 mL of bi-distilled water was applied to the coated glass. 2 minutes after water was removed, the sample was dried again and the weight of polymer film was quantified. For each polymer coating, six successive washing/drying cycles were done [S4].

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