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Disulfide-containing polyamidoamines with remarkable flame retardant activity for cotton fabrics

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Abstract

Bioinspired polyamidoamines containing disulfide-groups in the main chain (SS-PAAs), prepared by Michael polyaddition of 2,2-bis(acrylamido)acetic acid with *L*-cystine (B-CYSS) and of N,N'-bis(acryloyl-*L*-cystine) with either glycine or 2-methylpiperazine (BACYSS-GLY and BACYSS-MP), were investigated as intumescent surface-confined flame retardants for cotton textiles. The main purpose was to ascertain if the presence of disulfide functions in the repeat units imparted superior flame retardant properties compared with sulfur-deprived polyamidoamines whose efficacy were previously demonstrated. In horizontal flame spread tests, at 18% add-on both BACYSS-GLY and BACYSS-MP inhibited ignition; at 12% add-on BACYSS-GLY extinguished flame, whereas BACYSS-MP burnt completely leaving substantial carbonaceous residues. In vertical flame spread tests, both BACYSS-GLY and BACYSS-MP burnt completely leaving substantial residues up to at least 18% add-on. At 12% add-on B-CYSS inhibited ignition in both horizontal- and vertical flame