New water-soluble polypyridine silver(I) derivatives of 1,3,5-triaza-7-phosphaadamantane (PTA) with significant antimicrobial and antiproliferative activities.

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Streszczenie

The new series of silver(I) coordination polymers $[Ag(N–N)(\mu\text{-}PTA)]_n(X)_n$ (**1**, **2**, **4–8**, **10**, **11**) and discrete monomers $[Ag(N–N)(PTA)_2](X)$ (**3**, **9**) {N–N = bpy (**1–3**), dtbpy (**4**), neocup (**5**, **6**), phen (**7–9**), dione (**10**, **11**); X = NO_3 (**1**, **3**, **5**, **7**, **9**, **10**), PF_6 (**2**, **4**, **6**, **8**, **11**)} were generated by self-assembly reactions, in MeOH at ~25 °C, of $AgNO_3$ or $AgPF_6$ with 1,3,5-triaza-7-phosphaadamantane (PTA) and the corresponding polypyridines, namely 2,2′-bipyridine (bpy), 4,4′-di-tert-butyl-2,2′-bipyridine (dtbpy), 1,10-phenanthroline (phen), 2,9-dimethyl-1,10-phenanthroline (neocup) and 1,10-phenanthroline-5,6-dione (dione). The compounds were obtained as air and light stable solids and characterized by IR, ^1H and $^{31}P\{^1H\}$ NMR spectroscopy, ESI^+-MS and elemental analyses. The crystal structure of **1** was determined by single crystal X-ray diffraction analysis, revealing infinite one-dimensional (1D) linear chains driven by μ-PTA N,P-linkers. Apart from representing the first examples of the metal–PTA derivatives bearing polypyridine ligands, **1–11** also feature solubility in water ($S_{25°C}$ ≈ 4–18 mg mL^{-1}). Selected compounds (**1**, **3**, **5**, **7**, **9** and **10**) were thus tested for their biological properties and found to exhibit significant antibacterial and antifungal activities, screened in vitro against the standard strains of Staphylococcus aureus, Staphylococcus pyogenes, Staphylococcus pneumoniae, Staphylococcus sanguinis, Staphylococcus mutans, Enterococcus faecalis, Pseudomonas aeruginosa, Escherichia coli and Candida albicans. Furthermore, the compounds **5**, **7**, **9** and **10** show a pronounced antiproliferative activity against human malignant melanoma (A375), and the effects on the inhibition of tumor cells in vitro are in agreement with the DNA-binding studies.

Adres publiczny

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