Novel antibacterial silver(I) coordination polymers based on a flexible bis(pyrazolyl)-type ligand

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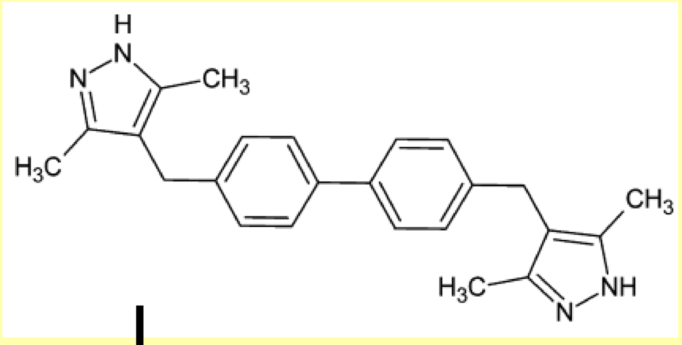
Introduction

In the last two decades, a massive attention has been focused on the design of silver(I)-based coordination polymers (CPs), combining interesting structural topologies [1] with outstanding functional properties such as photoluminescence [2], guest exchange or uptake [3], permanent porosity [4], conductivity [5], magnetism [6], and even antibacterial activity [2,7]. The novel silver(I) CPs [Ag(H_2DMPMB)(X)] (X = NO_3, **1**; CF_3COO, **2**; CF_3SO_3, **3**; BF_4, **4**; ClO_4, **5**; PF_6, **6**), based on the flexible ditopic ligand 4,4'-bis((3,5-dimethyl-1*H*-pyrazol-4-yl)methyl)biphenyl (H_2DMPMB), have been isolated and characterized by means of infrared spectroscopy, elemental analysis and thermogravimetric analysis. The antibacterial activity of these CPs was tested against the Gram-negative bacteria *E. coli* and Gram-positive bacteria *S. aureus* using the Tetrazolium/formazan-test method (TTC). The activity and viability of the cells was determined by measuring the formazan absorbance value at 480 nm.

Synthesis and FTIR characterization

AgX +

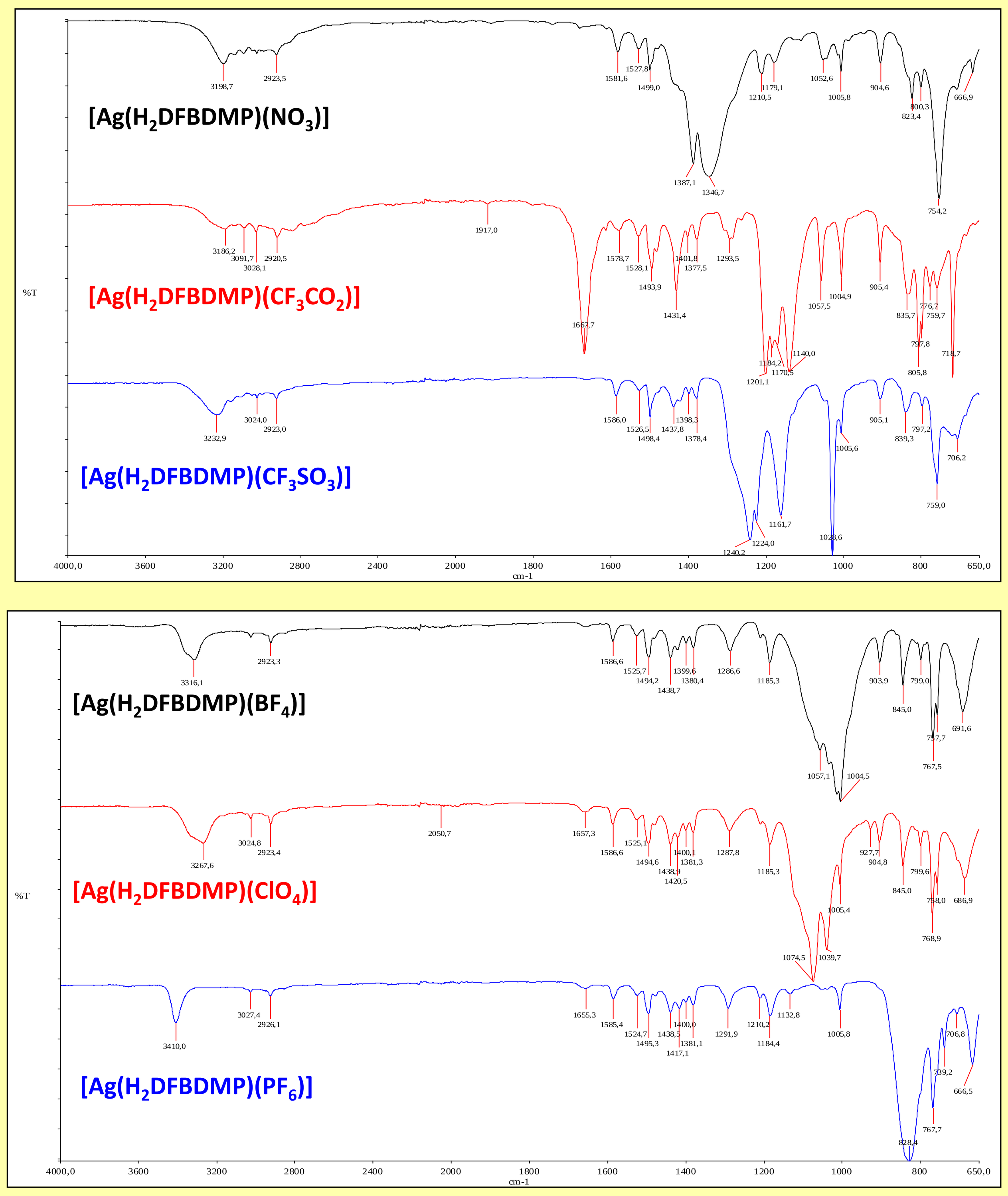


H_2DMPMB

MeOH
r.t., 24 h

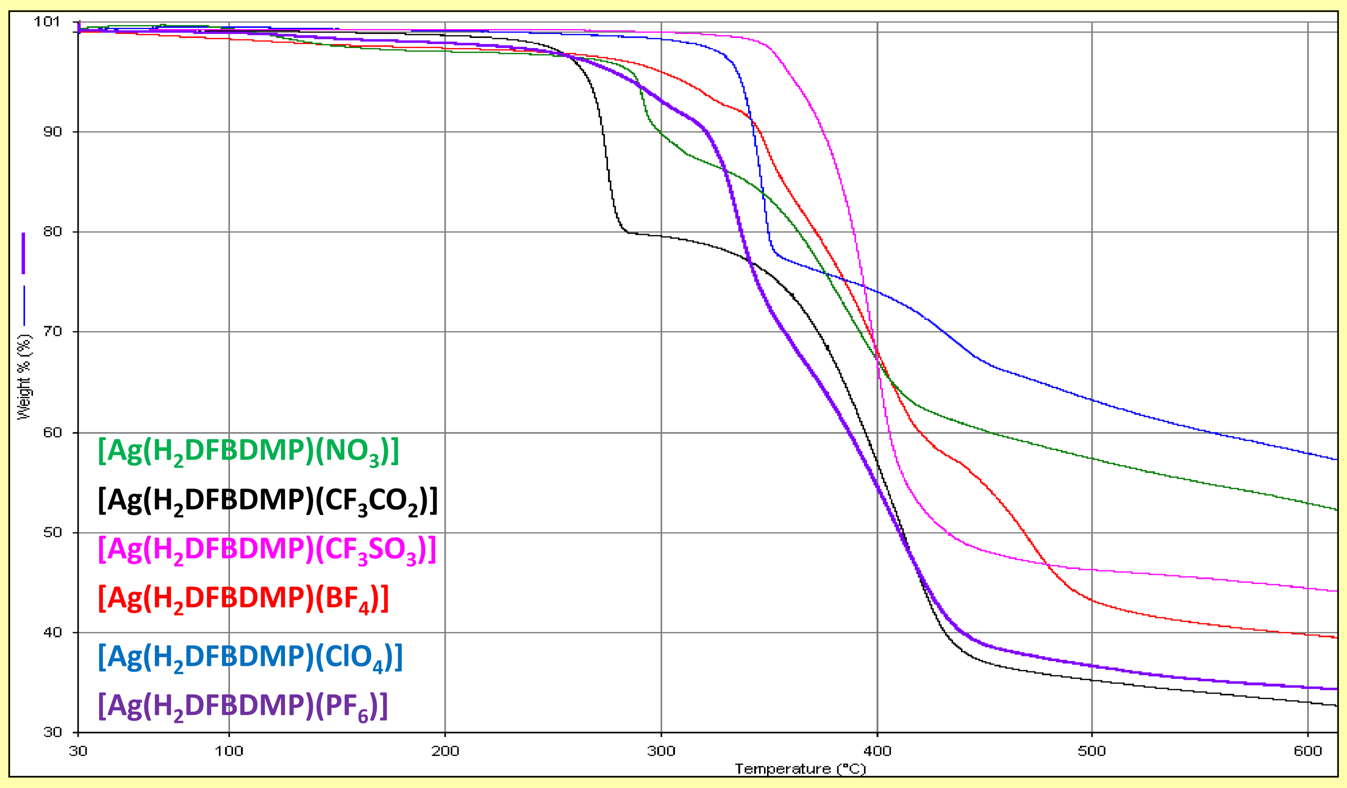
[Ag(H_2DFBDMP)(X)]$_n$

(X = NO_3, **1**; CF_3COO, **2**; CF_3SO_3, **3**; BF_4, **4**; ClO_4, **5**; PF_6, **6**)



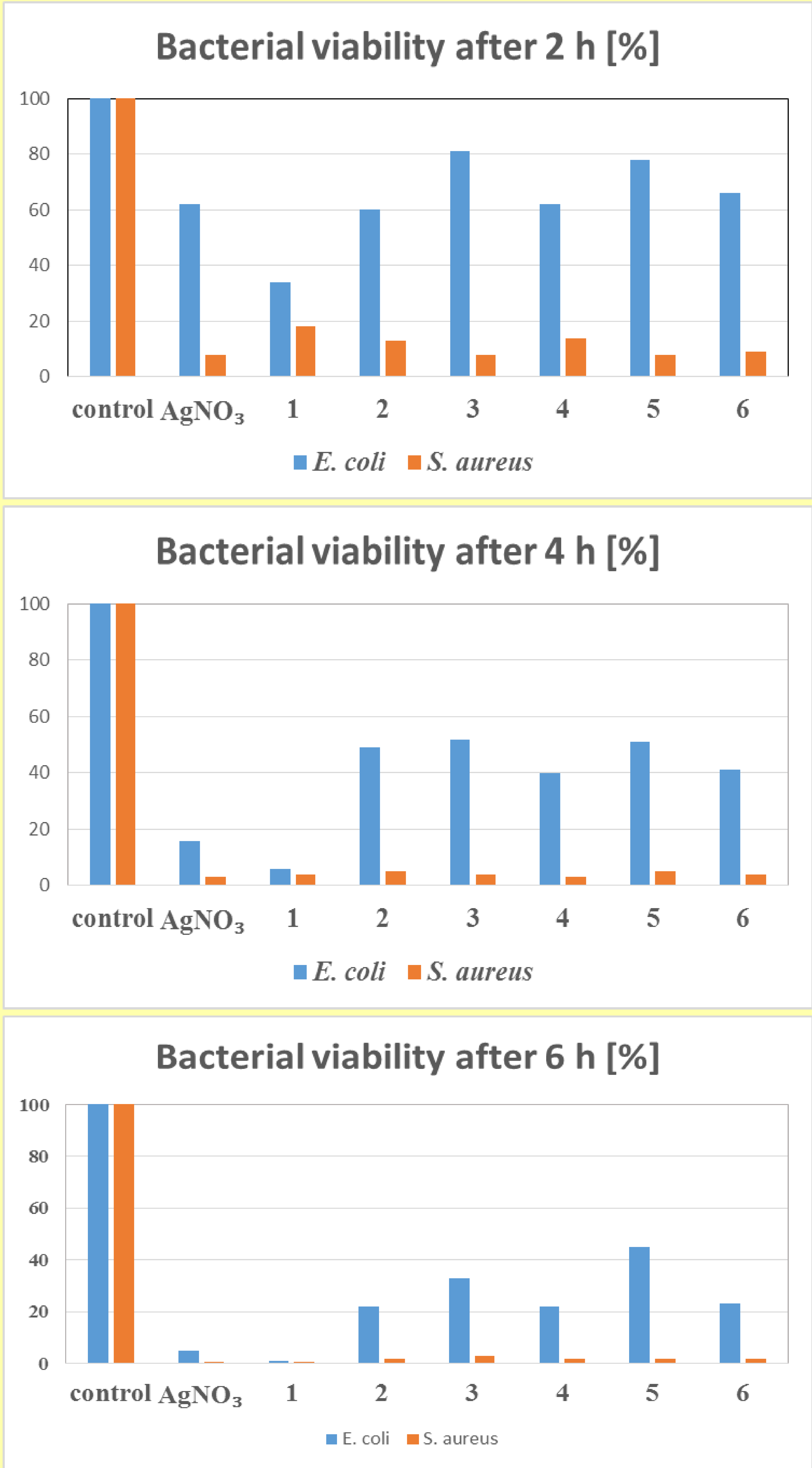
FTIR spectra of the obtained Ag(I) CPs

Thermogravimetric analysis (TGA)



TGA curves of the obtained Ag(I) CPs

Antibacterial activity



Bacterial viability of the obtained Ag(I) CPs after 2, 4 and 6 h. Control means untreated bacteria. $AgNO_3$ was used as standard.

Concluding Remarks

Results showed that the novel Ag CPs are interesting platforms to explore as antibacterial agents. The antibacterial properties proved by our Ag CPs on inhibition of antibiotic-resistant strains as *E. coli* and *S. aureus,* are promising tools for a worldwide problem, which become a worrying issue: the multiplication of highly multidrug-resistant bacteria in clinical medicine.

References

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