Self-acidification of molybdenum-containing compounds: A new approach for antibacterial materials

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The increase in hospital acquired infections together with the development of antibiotics resistant microorganisms represents a great issue in healthcare facilities.

Our current work has been focused on the synthesis, characterization, antibacterial testing and mechanistic proof of action for compounds containing molybdenum. Different molybdate powders (Ag_2MoO_4, $CuMoO_4$, $Cu_3Mo_2O_9$, $CaMoO_4$ and Mo-W-O mixed oxides with Mo/W ranging from pure MoO_3 to pure WO_3) were produced by chemical synthesis. Their morphological and structural properties were studied, and different powder concentrations were tested for antibacterial activity against *Escherichia coli*. The goal was to find new active materials and to clarify the mechanism responsible for their antibacterial feature. Ag-, Cu-, and some W-containing molybdenum oxides showed promising antibacterial activity. For molybdates containing Ag and Cu, the antibacterial activity was related to release of Ag^+ and Cu^{2+} ions, in addition to moderate medium acidification [1]. Only the compositions with high concentration of Mo showed antibacterial features for W-containing molybdates. These compounds were also responsible for a strong medium acidification (pH < 4.5), which was proven to be responsible for their antibacterial feature [2].

[1] D. Tanasic, A. Rathner, J. P. Kollender, P. Rathner, N. Müller, K. C. Zelenka, A. W. Hassel, C. C. Mardare, *Biointerphases* **12** (2017) 05G607

[2] Z. Gajarska, K. C. Zelenka, P. Rathner, D. Recktenwald, J. P. Kollender, K. Shahzad, N. Müller, A. W. Hassel, C. C. Mardare, *ACS Appl. Bio Mater.* **2** (2019) 1477−1489