

Reactivity of Ag(2+) compounds towards organic matter

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Sala de grados (Semipresencial)

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While AgF₂ had been first prepared by Moissan and has been known (since the Manhattan project) to induce extensive fluorination of organic matter, the reactivity of non-fluorous salts of Ag(2+) has been much less researched. Preparation of AgSO₄ [1] and subsequent optimization of its synthesis using cheap electro-preparative methods [2] allowed for the formation of the first metastable hydrate of a Ag(2+) salt [3]. Both AgSO₄ and its hydrate proved to be immensely reactive towards organic matter [4,5] owing mostly due to the presence of open-shell Ag(2+) cation with its d⁹ electronic configuration, with the free radical character transferred to the ligands. Simultaneously, these reagents are F-free and thus unable to induce fluorination, which predominates reactivity of their AgF₂ sibling.

In this lecture, diverse types of reactivity of Ag(2+) oxo salts towards organic matter will be outlined, including outer-sphere electron transfer (1e⁻ oxidation), C-H bond activation followed by C-C coupling, O-insertion in C-H bonds, Diels-Alder and other pericyclic reactions, as well as polymerization reactions.

Literature

[1] P. Malinowski et al., *Angew. Chem. Int. Ed. Engl.*, 49(9): 1683-1686 2010.

[2] P. Połczyński et al., *Chem. Commun.* 49(68): 7480-7482 2013; *Eur. J. Inorg. Chem.* (35): 5401-5404 2016.

[3] T. E. Gilewski et al., *Chem. Eur. J.* 23(8): 1805-1813 2017.

[4] A. Budniak et al., *New J. Chem.* 41(19): 10742-10749 2017; P. J. Leszczyński et al., *J. Fluor. Chem.* 218: 105-110 2019; *Polycyc. Aromat. Comp.* 41(4): 795-804 2021

[5] PCT/IB2016/001280 (WO/2017/042624) priority date Sep 11, 2016; Polish patent application, priority date Oct 6, 2021.

Bio

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Professor Wojciech Grochala's (b. 1972) career has been linked to the University of Warsaw (M.Sc. 1995, Ph.D. 1998, D.Sc. 2005, prof. extraord. UW 2011, prof. titular 2014, prof. ord. UW 2016). Since 2004 r. he leads the Laboratory of Technology of Novel Functional Materials. He spent postdoctoral stays in the USA (with Roald Hoffmann at Cornell Univ.) and in the UK (with prof. Peter P. Edwards at Univ. of Birmingham). He was visiting professor at Geophysical Lab, Carnegie Institution of Washington and Cornell University. Prof. Grochala coauthors ca. 180 papers and book chapters as well as 3 international patents. He has promoted twelve PhD and lectured one hundred times at scientific institutes worldwide; he coauthored over two hundred conference contributions. His scientific interests are in materials, inorganic, physical and computational chemistry (particularly for solids) and more recently also organic chemistry. He explores new materials for hydrogen storage, atypical compounds of divalent silver, magnetic materials and compounds of noble gases (particularly the lightest ones). For several years he has been teaching the students of humanities at Artes Liberales College. Growing exotic plants and cheesemaking are his hobbies, so is prose and poetry writing.