Design of Artificial Enzymes Using the Metals of the Periodic Table

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UNESCO celebrates 2019 as the "International Year of the Periodic Table of Chemical Elements" and the 150th anniversary of its creation by Dmitry Mendeleev. Metalloproteins and metal-containing enzymes are well known to be essential to life. Synthetic Biochemistry and Inorganic Chemistry come together in a synergistic manner, in order to elucidate structure and functional aspects of metal sites in enzymes. In particular, small proteins and synthetic peptides involving rich sulfur coordination sites. Rubredoxins (Rds) and analogues have been extensively used. The tetra-cysteinyl metal coordination site available in Rd has the surprisingly capacity of chelating a wide variety of metal ions (beyond Fe) such as Zn, Co, Cd, Ga, In, Hg Ni, Cu, as well as Mo (and W), with particular interest in modelling [Ni,Fe]-Hydrogenases and mononuclear molybdenum/tungsten-bis pyranopterin-containing enzymes (Mo/W-bis PDG) and other systems. Other examples will be elucidated.

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