

1. Record Nr.	UNINA9910993973703321
Titolo	Polyoxometalate chemistry : some recent trends / / editor, Francis Secheresse
Pubbl/distr/stampa	Hackensack [NJ], : World Scientific, c2013 New Jersey : , : World Scientific, , [2013] 2013
ISBN	9789814458986 9814458988 9789814458979
Edizione	[1st ed.]
Descrizione fisica	1 online resource (360 pages)
Collana	World Scientific series in nanoscience and nanotechnology ; ; v. 8
Altri autori (Persone)	SecheresseFrancis
Disciplina	546/.3
Soggetti	Polyoxometalates Coordination compounds
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index. Includes bibliographical references.
Nota di contenuto	Intro -- CONTENTS -- Preface -- List of Color Plates -- COLOR PLATE 1 -- COLOR PLATE 2 -- COLOR PLATE 3 -- COLOR PLATE 4 -- COLOR PLATE 5 -- COLOR PLATE 6 -- COLOR PLATE 7 -- COLOR PLATE 8 -- COLOR PLATE 9 -- COLOR PLATE 10 -- COLOR PLATE 11 -- COLOR PLATE 12 -- COLOR PLATE 13 -- COLOR PLATE 14 -- COLOR PLATE 15 -- COLOR PLATE 16 -- COLOR PLATE 17 -- COLOR PLATE 18 -- COLOR PLATE 19 -- COLOR PLATE 20 -- COLOR PLATE 21 -- COLOR PLATE 22 -- COLOR PLATE 23 -- COLOR PLATE 24 -- COLOR PLATE 25 -- COLOR PLATE 26 -- COLOR PLATE 27 -- COLOR PLATE 28 -- COLOR PLATE 29 -- COLOR PLATE 30 -- COLOR PLATE 31 -- COLOR PLATE 32 -- COLOR PLATE 33 -- COLOR PLATE 34 -- COLOR PLATE 35 -- COLOR PLATE 36 -- Chapter 1 Polyoxometalate-Protected Metal Nanoparticles: Synthesis, Structure and Catalysis Yifeng Wang and Ira A. Weinstock -- 1. Introduction -- 2. Synthesis of Polyoxometalate Stabilized Metal(0) Nanoparticles -- 2.1. Control over shape and size -- 2.2. Ir and Ru nanoparticles by H ₂ reduction -- 2.3. Reactions of metal salts with reduced polyoxometalate anions -- 2.3.1. Synthesis of

nanoparticles -- 2.3.2 Synthesis of complex nanostructures -- 2.4. Ligand-exchange reactions -- 3. Structures of Inorganic Cluster Anions Stabilized Nanoparticles -- 3.1. Evidence for the stabilization of metal (0) nanoparticles by polyoxometalates -- 3.2. Direct imaging of POM-ligand monolayers by cryo-TEM -- 3.3. Electric double layer of a polyoxometalate-stabilized nanoparticle -- 4. Application of POM-stabilized Au NPs in Catalysis -- 4.1. Hydrogenation reactions using POM-stabilized metal NPs -- 4.2. Molecular oxygen activation reactions for organic synthesis -- 4.3. Other organic reactions catalyzed by polyoxometalate-stabilized metal nanoparticles -- 4.4. Electrocatalysis -- 5. Closing Comments -- References.

Chapter 2 When Giants Meet Dwarves in the Same Pond - Unique Solution Physical Chemistry Opportunities Offered by Polyoxometalate Macroions Dong Li, Panchao Yin and Tianbo Liu -- 1. Introduction and Retrospection -- 1.1. Derivation of the Debye-Hückel's limiting theory -- 1.2. General features of the DLVO theory -- 1.2.1. DLVO potential and the primary and secondary minima -- 1.2.2. Limitations of the DLVO theory -- 2. Characterization of Macroion Solution Behaviors -- 2.1. Polyoxometalates (POMs) type macroanions -- 2.1.1. Characterization of the self-assembly of POM macroanions in dilute solutions -- 2.1.2. The driving forces that responsible for the unexpected self-assembly of macroanions -- 2.1.2.1. Van der Waals attractions -- 2.1.2.2. Hydrogen bonding -- 2.1.2.3. Counterions mediated attractions -- a) Interactions between discrete macroions and counterions -- b) Effect of surface charge density -- c) Effect of counterion valence state and counterion hydrated size -- d) Effect of ionic strength -- 2.1.2.4. Solvent effect -- 2.1.3. Kinetics of the blackberry formation -- 2.1.3.1. Long equilibrium time -- 2.1.3.2. High activation energy -- 2.1.3.3. Slow nucleation and fast aggregation -- 2.2. Self-assembly of macrocations -- 3. Connection to Virus Capsid Formation -- 3.1. Trans-membrane transport of counterions over blackberry surface -- 4. Inorganic-Organic Hybrid POMs -- 4.1. The motivation of synthesizing new hybrid POMs -- 4.2. POMs based amphiphilic surfactants and their assemblies -- 4.2.1. Diblock hybrid surfactants -- 4.2.2. Triblock hybrid surfactants -- 4.2.2.1. Organic-inorganic-organic type hybrid surfactants -- 4.2.2.2. Inorganic-organic-inorganic type hybrid surfactants -- 4.2.3. Comparison with blackberries -- 5. Conclusions -- Acknowledgement -- References.

Chapter 3 Directed Assembly of Polyoxometalates Across Length Scales: From Macro-Molecules to Microsystems and iChells Antoine G. Boulay, Geoffrey J. T. Cooper and Leroy Cronin -- 1. Building Blocks to Cation Control -- 1.1. Background -- 1.2. Isopolyoxometalates and their derivatives -- 2. Host-Guest Chemistry to Networks -- 2.1. Cage compounds and switchable POMs -- 2.2. POM based architectures and framework materials -- 2.3. Organic-inorganic hybrids POMs -- 3. Extended Architectures Based on Transition Metal Salts/Oxides: Tubes, iChells and Blackberries -- 3.1. Tubular systems: Mechanism of formation -- 3.2. Particular tubes/minimal systems -- 3.3. Growth control -- 3.4. Formation of inorganic-chemical cells: iCHELLs -- 3.5. iCHELL chemistry -- 4. Conclusions -- Acknowledgements -- References -- Chapter 4 Magnetic Polyoxometalates Juan M. Clemente-Juan, Eugenio Coronado and Alejandro Gaita-Ariño -- 1. Introduction -- 2. Spin Clusters -- 3. Single-molecule Magnets -- 4. Mixed-valence Clusters -- 5. Conclusions -- Acknowledgements -- References -- Chapter 5 Magnetism of Keplers Paul Kögerler -- 1. Introduction -- 2. From Pentagonal Building Blocks to Keplers -- 3. The {Mo₇₂Fe₃₀} System: From Classical to Quantum Spin Models -- 4. The Quantum-spin Keplers {Mo₇₂V₃₀} and {Mo₇₂Cr₃₀} -- References -- Chapter 6

Polyoxometalates as Ligands for Functional Lanthanoid Complexes
Chris Ritchie and Colette Boskovic -- 1. Introduction -- 2. Synthesis and Structures -- 2.1. Ln-POMs and Ln-org-POMs synthesized in the presence of acetate -- 2.2. Ln-org-POMs synthesized in the presence of glycine -- 2.3. Ln-org-POMs synthesized in the presence of 2-picolinate -- 3. Magnetic Properties -- 4. Luminescence Properties -- 5. Concluding Remarks -- Acknowledgements -- References -- Chapter 7 Polyoxothiometalates POTM Francis Sécheresse and Emmanuel Cadot.

1. Introduction -- 1.1. Thiometalates -- 2. Polyoxothiometalates POTM -- 2.1. The choice of a precursor -- 2.1.1. $[\text{Mo}_2\text{O}_2\text{S}_2]^{2+}$ a promising precursor -- 2.1.2. $[\text{Mo}_3\text{S}_4]^{4+}$ a possible building block for the coordination to vacant POMs -- 2.2. Self-condensation of the $\{\text{Mo}_2\text{O}_2\text{S}_2\}^{2+}$ precursor -- 2.3. Condensations via inorganic assembling groups -- 2.3.1. Halides as templates -- 2.3.2. Examples of other weak bases acting as templating groups -- 2.3.2.1. Dynamics associated to phosphate template effect -- 2.3.2.2. Rings based on phosphate anions -- 2.4. POTM derived from organic templates -- 2.4.1. Ring design with carboxylate and dicarboxylates -- 2.4.2. Adaptability and stability of host-guest rings -- 2.4.2.1. Example of C6, C7, and C8 based rings -- 2.4.2.2. Intrinsic stability -- 2.4.3. Example of dynamic associated to dicarboxylate templating -- 2.4.4. DOSY NMR methods applied to host-guest rings -- 3. Polyoxothiometalates Derived from the Archetypal Keggin Structure -- 3.1. Functionalization of polyvacant polyoxometalates -- 3.1.1. Example of $[\text{-SiW}_{10}\text{O}_{36}]^{8-}$ -- 3.1.2. Examples of the monovacant Keggin $[\text{-PW}_{11}\text{O}_{39}]^{7-}$ and Dawson $[\text{P}_2\text{W}_{17}\text{O}_{61}]^{10-}$ -- 3.1.3 Trivacant polyoxometalates as ligands -- 3.1.3.1. Reaction of $\{\text{M}_2\text{O}_2\text{S}_2\}$ with $[\text{A-PW}_9\text{O}_{34}]^{9-}$ -- 3.1.3.2. Reaction of $\{\text{M}_2\text{O}_2\text{S}_2\}$ with $[\text{B-P}_2\text{W}_{15}\text{O}_{56}]^{12-}$ -- 3.1.3.3. Reaction of $\{\text{M}_2\text{O}_2\text{S}_2\}$ with $[\text{A-AsW}_9\text{O}_{33}]^{9-}$ -- 3.1.4. Tetravacant-trivacant POMs conversion induced by $\{\text{Mo}_2\text{O}_2\text{S}_2\}$ coordination -- 4. $[\text{Mo}_2\text{O}_2\text{S}_2(\text{OH})_2]^{2+}$ a Building Block Involved in Mo- and W-giant Capsules -- 4.1. Sulfurated Kleperates -- 4.1.1. Sulfates as stabilizing ligands -- 4.1.2. Acetates as stabilizing ligands -- 5. Functionalization of vacant POMS by $[\text{Mo}_3\text{S}_4(\text{H}_2\text{O})_9]^{4-}$ -- 5.1. Saturation of a monovacant Dawson POM -- 5.2. Mo_3S_4 as supramolecular linker -- Conclusion -- References -- Index.

Sommario/riassunto

The book highlights recent prominent results in the domain of the synthesis of new polyoxometalates with a specific attention to polyoxothioanions, and provides some novelties and perspectives in selected domains such as magnetism, luminescence and nanochemistry, and macroions self-assembly in solutions. The case of "one-pot" syntheses often used and reported in POMs synthesis is studied in terms of more complex solution speciation processes related to highly dynamical situation connected to factors such as pH, ionic strength, reaction time, temperature, counterion nature, concentration of sta
