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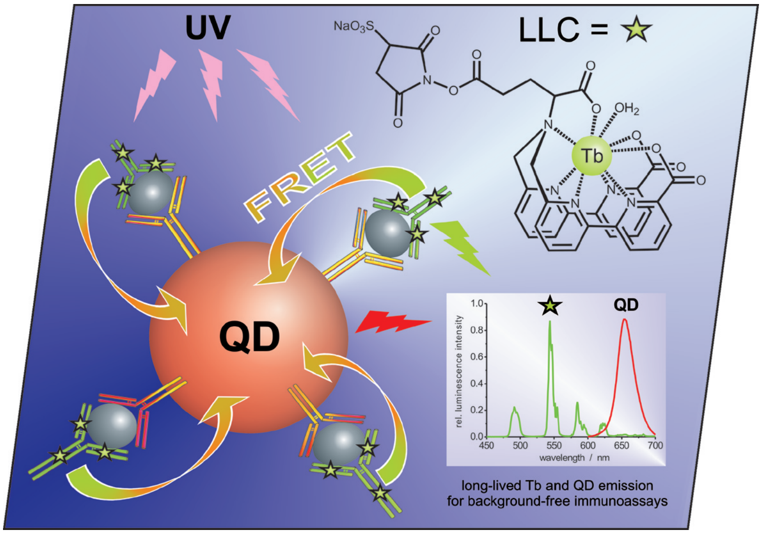
**The EUChemSoc Societies have taken the significant step into the future by merging their traditional journals, to form two leading chemistry journals, the *European Journal of Inorganic Chemistry* and the *European Journal of Organic Chemistry*. Three further EUChemSoc Societies (Austria, Czech Republic and Sweden) are Associates of the two journals.**

# COVER PICTURE

**The cover picture shows** the schematic realization of a homogeneous fluoroimmunoassay using Förster resonance energy transfer (FRET) from luminescent lanthanide complexes (LLCs – an example of a Tb complex is shown in the top right corner) to a biocompatible CdSe/ZnS quantum dot (QD). Excitation of the immunocomplex formed by the association of QD-labeled antibodies, antigen and LLC-labeled antibodies by UV light (e.g. 315 nm) leads to a long-lived Tb and QD luminescence (luminescence spectra shown in the bottom right corner) due to FRET sensitization by the LLCs. This new immunoassay approach opens doors to extremely sensitive background-free fluoroimmunoassays suitable for multiplexing by using several different QDs as FRET acceptors with a single LLC donor. Details are discussed in the Microreview by L. J. Charbonnière and N. Hildebrandt on p. 3241ff.



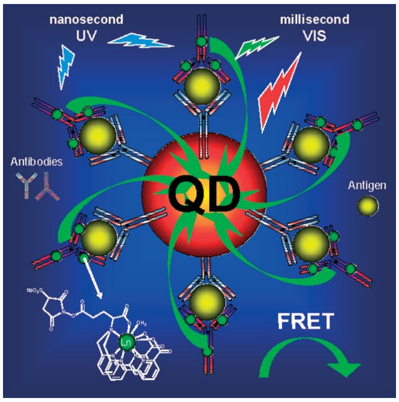
## MICROREVIEW

### Resonance Energy Transfer

**L. J. Charbonnière,***
**N. Hildebrandt** ........................ 3241–3251

Lanthanide Complexes and Quantum Dots: A Bright Wedding for Resonance Energy Transfer

**Keywords:** Lanthanides / Quantum dots / Immunoassays / Luminescence / FRET (Fluorescence Resonance Energy Transfer)



Lanthanides go on the dot! Using quantum dots and luminescent lanthanide complexes in FRET experiments offers many advantages such as high sensitivity, large Förster radii, and multiplexing. The two FRET partners are described both as individuals or when combined in a powerful FRET couple. This microreview covers theoretical and practical background for FRET applications.

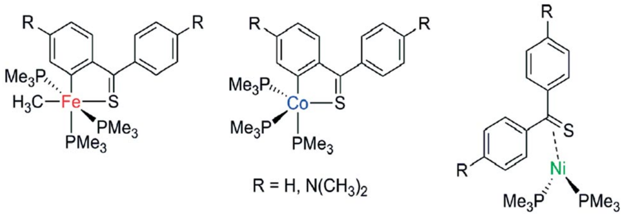
## SHORT COMMUNICATIONS

### C–H Activation

**R. Beck,* H. Sun,* X. Li, S. Camadanli,**
**H.-F. Klein** ............................. 3253–3257

Cyclometalation of Thiobenzophenones with Mononuclear Methyliron and -cobalt Complexes

**Keywords:** C–H activation / Cyclometalation / Cobalt / Iron / Nickel / S ligands



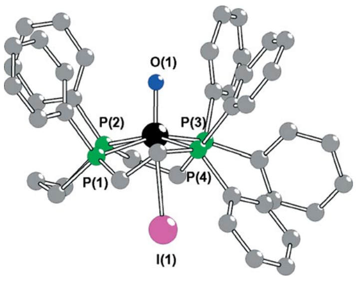
For the first time, under very mild conditions (–70 °C), the cyclometalation of thiobenzophenones by C–H activation with basic mononuclear iron and cobalt centers was observed. Reductive elimination constitutes a zerovalent $\eta^2$-C=S coordination at a nickel center.

### Dinitrogen-Molybdenum Complex

**R. Römer, G. Stephan, C. Habeck,**
**C. Hoberg, G. Peters, C. Näther,**
**F. Tuczek*** ............................. 3258–3263

Stereoselective Synthesis of the First Chatt-Type Bis(dinitrogen)-Molybdenum(0) Complex with a Tetraphosphane Ligand

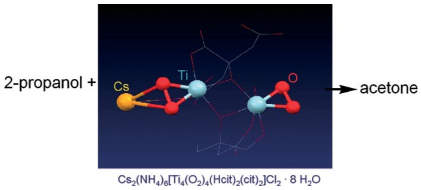
**Keywords:** Dinitrogen / Molybdenum / Phosphane ligands



The first $N_2$–$Mo^0$ complex with a tetraphosphane ligand has been prepared electrochemically from the oxido-iodido-$Mo^{IV}$ complex $[Mo(O)I(prP_4)]^+$ in the presence of $N_2$. Both, the starting material and the product *trans*-$[Mo(N_2)_2(prP_4)]$ carry P-bonded phenyl groups that are arranged in a *meso* configuration, providing a stereoselective route to the $N_2$ complex.

### Photooxidation of Alcohols

The novel cesium peroxidotitanate complex $Cs_2(NH_4)_6[Ti_4(O_2)_4(Hcit)_2(cit)_2]Cl_2·8H_2O$ (cit = citrate) shows significant activity in the photochemical oxidation (PCO) of 2-propanol and 1-phenylacetone. In the course of the PCO, two intermediates could be isolated. The discovery of a reduced oxygen species leads to a better understanding of the mechanism of secondary alcohol oxidation.



**M. Rohe, K. Merz*** .............. 3264–3268

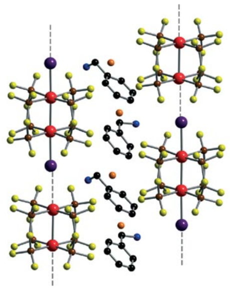
Influence of Metals and Reduced Oxygen Species on the Photooxidation of 2-Propanol with a Cesium Peroxidotitanate Complex

**Keywords:** Photooxidation / Reaction mechanism / Peroxides / Molecular approach

# FULL PAPERS

### Mixed-Valence Compounds

The titled compounds with an aromatic ammonium countercation, $A_4[Pt_2I(pop)_4]·nH_2O$ (pop = $P_2O_5H_2^{2-}$), were synthesized. The aromatic ammonium countercations formed π–π interactions and hydrogen bonds between the $-NH_3^+$ moieties and the oxygen atoms of the pop ligand, resulting in interconnected Pt chains. The structural network caused these compounds to adopt a three-dimensionally ordered CDW state.



Three-Dimensionally Ordered CDW State

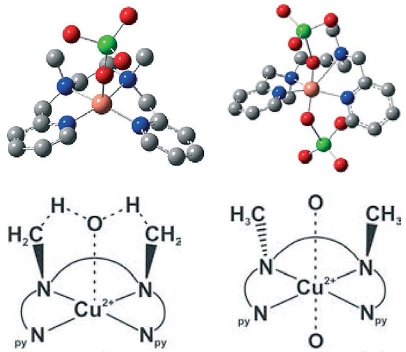
**S. Matsunaga,* K. Takizawa, D. Kawakami, H. Iguchi, S. Takaishi, T. Kajiwara, H. Miyasaka, M. Yamashita,* H. Matsuzaki, H. Okamoto** ... 3269–3273

Three-Dimensionally Ordered CDW State in Quasi-One-Dimensional Iodo-Bridged Dinuclear Platinum Mixed-Valence Compounds, $A_4[Pt_2I(pop)_4]·nH_2O$ (A = Aromatic Ammonium Cations)

**Keywords:** Platinum / Mixed-valence compounds / π–π Interactions / P ligands

### *cis*/*trans*-Copper(II) Complexes

*cis*-$[CuL^1]^{2+}$ was found to equilibrate with its *trans* isomer, whereas *trans*-$[CuL^2]^{2+}$ does not equilibrate with the *cis* isomer as a result of large energy differences. *cis*-$[CuL^1]^{2+}$ can accommodate a perchlorate ion in the axial position of the square pyramidal geometry, but the *trans* isomer is unable to retain the perchlorate ion in the coordination sphere.



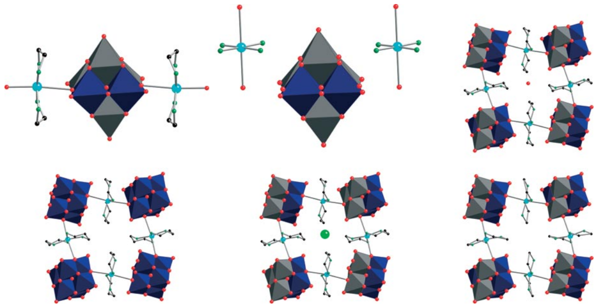
*cis*-$[CuL^1ClO_4]^+$ *trans*-$[CuL^2]^{2+}$

**T. Pandiyan,* H. J. Guadalupe, J. Cruz, S. Bernès, V. M. Ugalde-Salvdivar, I. González** .......................... 3274–3285

DFT and Experimental Studies of Perchlorate Ion Coordination in *cis*/*trans*-Copper(II) Complexes of Tetradentate Pyridyl Ligands

**Keywords:** Copper / Isomers / Density functional calculations / Redox chemistry

### Polyoxometalates



Six new phases composed of Lindqvist $[Nb_{6-x}W_xO_{19}]^{(8-x)-}$ ($x$ = 0–4) ions and (amine)copper complexes have been synthesized. The $[Nb_{6-x}W_xO_{19}]^{(8-x)-}$ clusters are either decorated, charge-balanced, or linked in a two-dimensional array by the (amine)copper complexes.

**T. M. Anderson, M. A. Rodriguez, T. A. Stewart, J. N. Bixler, W. Xu, J. B. Parise, M. Nyman*** ........ 3286–3294

Controlled Assembly of $[Nb_{6-x}W_xO_{19}]^{(8-x)-}$ ($x$ = 0–4) Lindqvist Ions with (Amine)copper Complexes

**Keywords:** Niobium / Tungsten / Copper / Polyoxometalates

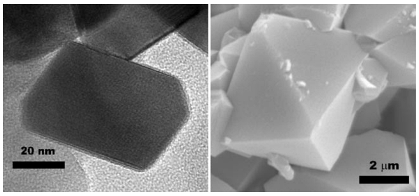
# CONTENTS

## Polymer-Assisted Crystalline Spinels

**J. C. Arrebola, A. Caballero, L. Hernán,***
**J. Morales ............................ 3295–3302**

Polymer-Mediated Growth of Highly Crystalline Nano- and Micro-Sized $LiNi_{0.5}Mn_{1.5}O_4$ Spinels

**Keywords:** Crystal growth / Polymers / Spinel phases / Lithium batteries



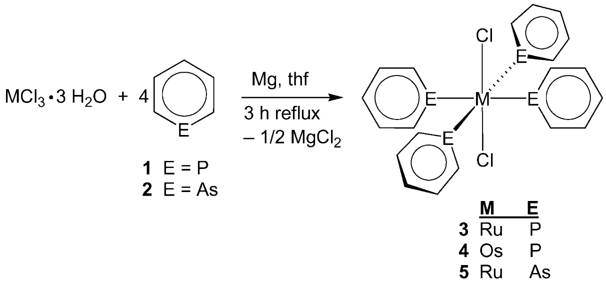
Highly crystalline nanometric particles of $LiNi_{0.5}Mn_{1.5}O_4$ spinel with a polyhedral shape are obtained by a simple and rapid method that uses polymers as template agents. Increased particle size with retention of the octahedral morphology is achieved by controlled calcination. These spinels are suitable as electrodes for high-voltage Li-ion batteries.

## Phosphinine and Arsenine Complexes

**C. Elschenbroich,* J. Six, K. Harms,**
**G. Frenking, G. Heydenrych ... 3303–3309**

$\eta^1$-Coordination of Phosphinine $C_5H_5P$ and Arsenine $C_5H_5As$ to Ruthenium(II) and Osmium(II)

**Keywords:** $Ru^{II}$ complex / $Os^{II}$ complex / Phosphinine ligand / Arsenine ligand / X-ray diffraction / Density functional calculations



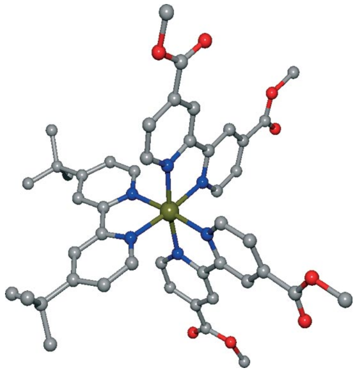
The species *trans*-$Cl_2(\eta^1\text{-}C_5H_5E)_4M$ (M = Ru, Os; E = P, As) are prepared by reductive complexation. Further reduction and isolation of the binary complexes $(C_5H_5E)_nM$ failed because of metal–ligand bond cleavage. *trans*-$Cl_2(\eta^1\text{-}C_5H_5P)_4Ru$ features two pairs of coplanar *trans*-phosphinine ligands, which adopt eclipsed and staggered orientations, respectively, with regard to the Cl–Ru–Cl backbone.

## Poly(bipyridine)ruthenium Complexes

**M. Schwalbe, B. Schäfer, H. Görls,**
**S. Rau,* S. Tschierlei, M. Schmitt,**
**J. Popp, G. Vaughan, W. Henry,**
**J. G. Vos .............................. 3310–3319**

Synthesis and Characterisation of Poly(bipyridine)ruthenium Complexes as Building Blocks for Heterosupramolecular Arrays

**Keywords:** Ruthenium / Bipyridine / Microwave-assisted reaction / Raman spectroscopy



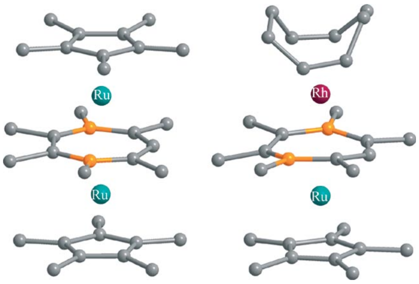
An improved microwave-assisted synthesis that leads to poly(bipyridine)ruthenium complexes with carboxylate anchor groups in high purity, which are key components in dye-sensitised solar cells, is presented. The location of the MLCT excited state was determined by resonance Raman spectroscopy. These data indicate an excitation-wavelength-dependent switch of the localisation of the excited state.

## Borataborepine Complexes

**E. V. Mutseneck, H. Wadepohl,**
**A. R. Kudinov,* W. Siebert* ... 3320–3329**

Cationic Triple-Decker Complexes with a Bridging 4-Borataborepine Ligand: Synthesis, Structure, and Bonding

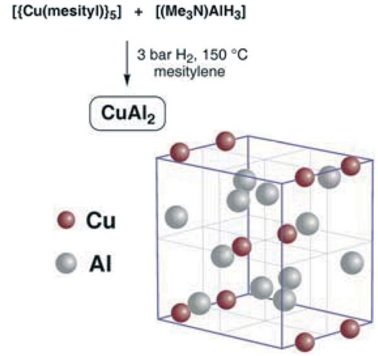
**Keywords:** Boron / Bonding analysis / Density functional calculations / Heterocycles / Ruthenium / Triple-decker complexes



Cationic triple-decker complexes with a 4-borataborepine ligand $[Cp^*Ru(\mu\text{-}\eta^7{:}\eta^7\text{-}C_5B_2RMe_5H)ML]^+$ were prepared by electrophilic stacking of sandwiches $Cp^*Ru(\eta\text{-}C_5B_2RMe_5H)$ with $[ML]^+$ fragments. The metal–ring bonding in two series of the related complexes CpRu(ring) and $[CpRu(ring)RuCp]^+$ (ring = Cp, $C_5BH_6$, $C_5B_2H_7$) was studied by using energy decomposition scheme and Mulliken population analysis.

## Nanoalloys

A generally applicable soft-chemical synthesis of transition-metal aluminide powder from organometallic complexes in organic solution was developed. The intermetallic $Cu_{1-x}Al_x$ phases ($0<x<1$) are synthesized by hydrogenolysis of $[\{Cu(mesityl)\}_5]$ and $[(Me_3N)AlH_3]$. This method also offers access to the low-temperature $\theta$-$CuGa_2$ phase by using the complex $[(quinuclidine)GaH_3]$.



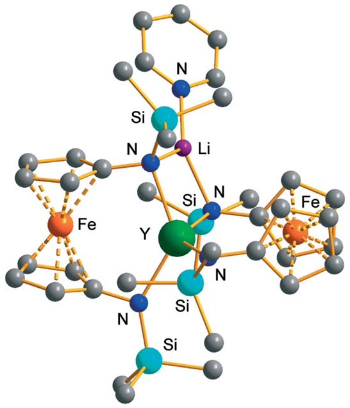
**M. Cokoja, B. R. Jagirdar, H. Parala, A. Birkner, R. A. Fischer*** ..... 3330–3339

Organometallic Access to Intermetallic $\theta$-$CuE_2$ (E = Al, Ga) and $Cu_{1-x}Al_x$ Phases

**Keywords:** Alloys / Intermetallic phases / Copper / Aluminum / Nanotechnology

## 1,3-Diaza-2-metalla-[3]ferrocenophanes

1,3-Bis(trimethylsilyl)-1,3-diaza-2-yttria-[3]-ferrocenophane derivatives were prepared and characterized in the solid state by X-ray structural analysis and in the liquid state by multinuclear magnetic resonance ($^1H$, $^{13}C$, $^{29}Si$, $^{89}Y$ NMR). The structure of an ate complex of four-coordinate yttrium as an ion pair or a separated ion pair depended on the amount of pyridine present.

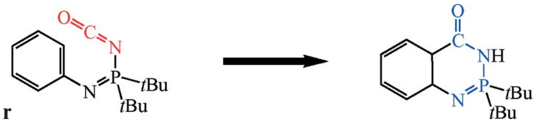


**B. Wrackmeyer,* E. V. Klimkina, W. Milius** ............................ 3340–3347

Five- and Four-Coordinate 1,3-Diaza-2-yttria- and 1,3-Diaza-2-scandia-[3]ferrocenophanes

**Keywords:** Yttrium / Scandium / [3]Ferrocenophanes / NMR spectroscopy / X-ray structural analysis

## Benzodiazaphosphininones



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A set of new *N*-arylphosphinimidic isocyanates has been prepared. These compounds spontaneously cyclized into previously unknown heterocycles: 1,3,2λ5-benzodiazaphosphinin(e)-4(3*H*)-(thi)ones. An alternative synthetic route to these compounds is proposed.

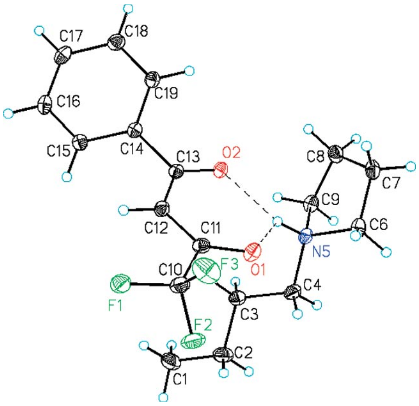
**A. P. Marchenko, G. K. Koydan, R. V. Smaliy,* A. A. Chaykovskaya, A. M. Pinchuk, A. A. Tolmachev, O. V. Shishkin** ...................... 3348–3352

Intramolecular Cyclization of *N*-Arylphosphinimidic Isocyanates – Novel Approach to a 4a,8a-Dihydro-1,3,2λ5-benzodiazaphosphinin-4(3*H*)-one System

**Keywords:** 1,3,2λ5-Benzodiazaphosphinin-4(3*H*)-one / Heterocyclization / Phosphinimidic isocyanates / Phosphinous isocyanate

## Ionic Liquids

Fluorinated 1,3-diketones, 1,1,1,5,5,5-hexafluoroacetylacetone, 1,1,1-trifluoro-2,4-pentanedione, and 4,4,4-trifluoro-1-phenyl-1,3-butanedione, react with *N*-alkylpyrrolidine and *N*-methylpiperidine generating a new series of fluorine-containing ionic liquids with low melting points and low viscosities.



**X. Li, Z. Zeng, S. Garg, B. Twamley, J. M. Shreeve*** ...................... 3353–3358

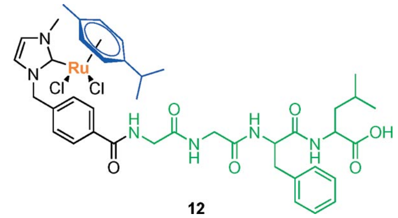
Fluorine-Containing Ionic Liquids from *N*-Alkylpyrrolidine and *N*-Methylpiperidine and Fluorinated Acetylacetones: Low Melting Points and Low Viscosities

**Keywords:** Ionic liquids / Fluorine / Cyclic amines / Low melting point / Low viscosity

# CONTENTS

## Bioorganometallic Chemistry

The synthesis of the first fully characterized metal-NHC peptide conjugate **12** prepared by solid-phase synthesis is reported. **12** contains a functionalized *p*-cymene ruthenium-NHC ligand and the pseudoenkephalin peptide.

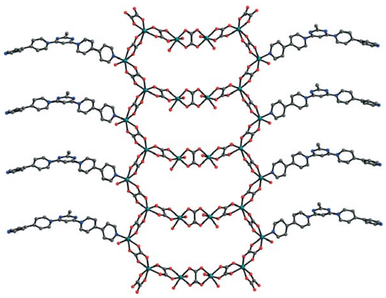


**12**

**Keywords:** Bioorganometallic chemistry / Imidazolium peptides / Metal carbene complexes / NHC ligands / Solid-phase synthesis

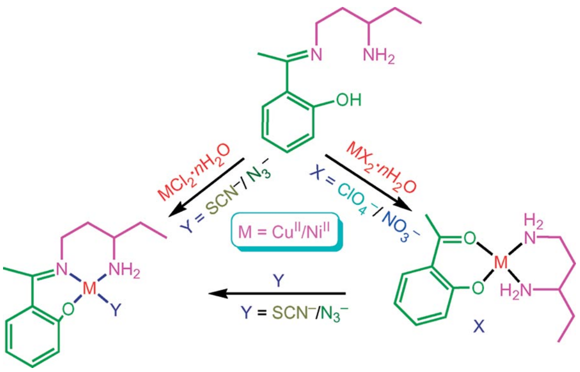
## Oxalate Complexes

Self-assembly of a newly synthesized 2-methyl-4,6-bis(4′-pyridyl-1′-pyridinio)-pyrimidine dichloride with $MnCl_2 \cdot 4H_2O$ and $Na_2C_2O_4$ afforded an unprecedented chain-like oxalate-bridged $Mn^{II}$ polymer consisting of 10-membered ring units, $\{[Mn_3(OH)(H_2O)_2(Mbpp)(C_2O_4)_{3.5}] \cdot 6.5H_2O\}_n$, which exhibited spin-canted antiferromagnetism at low temperature.



**Keywords:** Magnetic properties / Spin-canting / Oxalate complexes / Manganese / Bipyridinium

## Anion-Directed Template Synthesis



A mono-condensed Schiff base ligand, HL, has been synthesized from 1,3-pentanediamine and *o*-hydroxyacetophenone by using a $Ni^{II}$ template. HL reacts smoothly to form a complex with $Ni(NCS)_2$/$Cu(NCS)_2$/$CuN_3$ but undergoes hydrolysis on reaction with perchlorate or nitrate salts of $Cu^{II}$/$Ni^{II}$. The observations have been rationalized by an anion-directed cation templating effect.

**Keywords:** Nickel(II) / Copper(II) / Schiff bases / Hydrolysis / Template synthesis

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* Author to whom correspondence should be addressed.

💻 Supporting information on the WWW (see article for access details).