

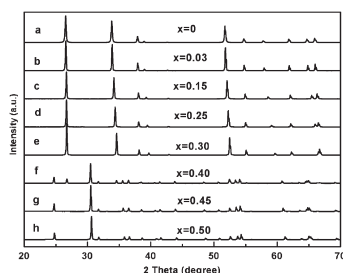
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Regular Articles

Preparation and magnetic properties of Fe³⁺-Nb⁵⁺ co-doped SnO₂

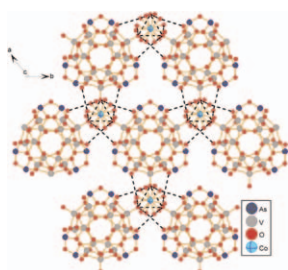
Yu Wang, Guangsheng Pang, Yan Chen, Shihui Jiao, Dong Wang and Shouhua Feng
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Fe³⁺-Nb⁵⁺ co-doped SnO₂ was prepared at 1200 °C by a simple chemical co-precipitation method. The Sn_{1-2x}Fe_xNb_xO₂ solid solutions kept cassiterite structure in the range of 0 < x ≤ 0.33, and their cell parameters decrease with increasing x. While x = 0.40, a second phase with orthorhombic FeNbO₄ structure co-exists with the cassiterite phase, and the second phase becomes dominant while x ≥ 0.45. The magnetic measurements indicated that low doping ratio sample (x = 0.03) exhibits paramagnetic behavior. A paramagnetic-to-antiferromagnetic phase transition was observed for the samples with higher doping ratio (x ≥ 0.15).

Two new hydrogen bond-supported supramolecular compounds assembly from arsenic vanadates and [M(H₂O)₆]²⁺ cations (M = Co, Ni)

Xiao-Bing Cui, Ke-Chang Li, Ling Ye, Yan Chen, Ji-Qing Xu, Wei-Jie Duan, Hai-Hui Yu, Zhi-Hui Yi and Ji-Wen Cui
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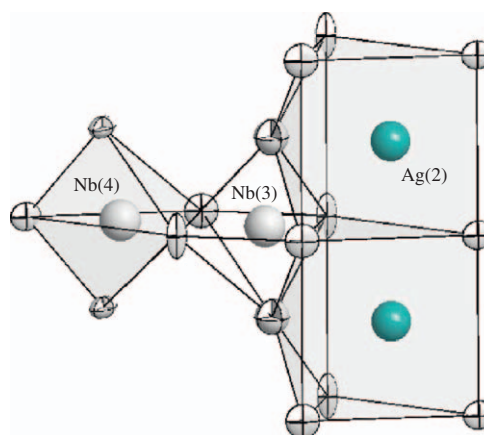


Two novel hydrogen bond-supported supramolecular compounds [H₂As₆V₁₅O₄₂(H₂O)] [Co(H₂O)₆]₂ · 2H₂O (1) and [H₂As₆V₁₅O₄₂(H₂O)] [Ni(H₂O)₆]₂ · 2H₂O (2) have already been synthesized and characterized by X-ray diffraction analyses, they are iso-structural and are constructed from arsenic-vanadium clusters and [Co(H₂O)₆]²⁺ or [Ni(H₂O)₆]²⁺ cations, respectively. Each of which exhibits novel 2-D supramolecular architecture.

Regular Articles—Continued

Crystal chemistry in the Ag₂O-Nb₂O₅ system AgNb₃O₈ structure determination

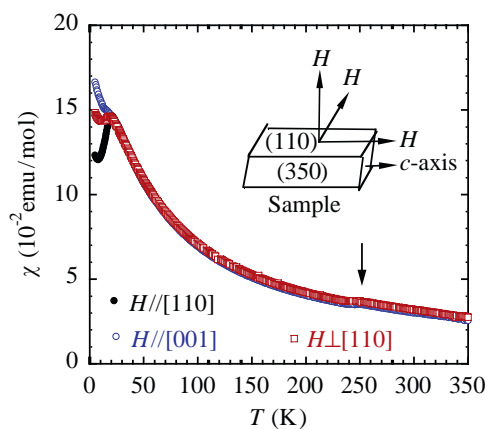
Patrick Rozier and Olivier Szajwaj
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The investigation via conventional solid-state route allows to settle the different compounds of the AgNbO₃-Nb₂O₅ system. The structure of a new form of AgNb₃O₈ is detailed. It is related to the TTB type network with a specific mixed Ag/Nb occupancy of pentagonal tunnel driving to possible but not observed ordering.

Magnetic properties of Mn₂V₂O₇ single crystals

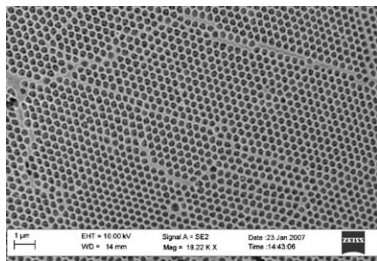
Zhangzhen He and Yutaka Ueda
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A structural phase transition of the α-β forms occurs at 200–250 K and an antiferromagnetic ordering occurs at ~20 K. A field-induced spin-flop transition shows that spins of Mn²⁺ ions in Mn₂V₂O₇ may locate within honeycomb layers.

Preparation and characterization of three-dimensionally ordered macroporous yttria-stabilized zirconia by aqueous organic gel route

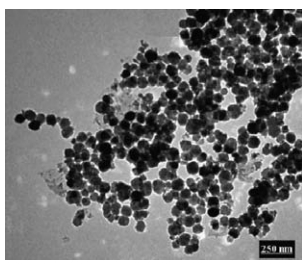
J.P. Zhao, Y. Li, W.H. Xin and X. Li
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Three-dimensionally ordered macroporous yttria-stabilized zirconia (YSZ) was prepared by aqueous organic gel method through the interstitial spaces between polystyrene spheres assembled on glass substrates. The morphologies of the porous YSZ, the thermal behavior, the phase and chemical composition of polystyrene/YSZ composite were investigated. Ni/YSZ was also prepared and the electrical conductivity was measured.

Studies on the magnetism of cobalt ferrite nanocrystals synthesized by hydrothermal method

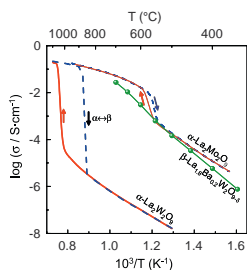
Lijun Zhao, Hongjie Zhang, Yan Xing, Shuyan Song, Shiyong Yu, Weidong Shi, Xianmin Guo, Jianhui Yang, Yongqian Lei and Feng Cao
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CoFe₂O₄ ferrite with a single-domain critical size of 70 nm was fabricated by controlling the hydrothermal reaction conditions carefully, which presents high coercive force (ca. 4.6 kOe) and high squareness ratio (ca. 0.65).

Phase stability and ionic conductivity in substituted La₂W₂O₉

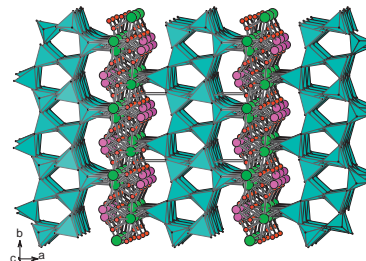
D. Marrero-López, J. Peña-Martínez, J.C. Ruiz-Morales and P. Núñez
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Several substitutions have been tested in order to investigate the stabilisation of the high temperature cubic β-La₂W₂O₉ and to obtain new ionic conductors with LAMOX structure without molybdenum composition.

La₄(Si_{5.2}Ge_{2.8}O₁₈)(TeO₃)₄ and La₂(Si₆O₁₃)(TeO₃)₂: Intergrowth of the lanthanum(III) tellurite layer with the XO₄ (X=Si/Ge) tetrahedral layer

Fang Kong, Hai-Long Jiang and Jiang-Gao Mao
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The first lanthanum(III) silicate/germanate tellurites, namely, La₄[(Si_xGe_{8-x})O₁₈](TeO₃)₄ (x = 5.18) and La₂(Si₆O₁₃)(TeO₃)₂, have been synthesized and structurally determined by single crystal X-ray diffraction. Both compounds feature complicated 3D network structures composed of the silicate/germanate tetrahedral layers alternating with the [LaTeO₃] layers.

MAS-NMR study of lithium zinc silicate glasses and glass-ceramics with various ZnO content

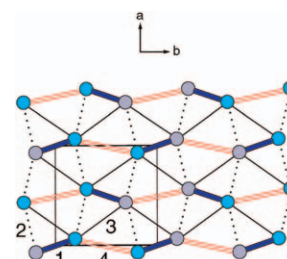
Madhumita Goswami, Govind P. Kothiyal, Lionel Montagne and Laurent Delevoye
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²⁹Si and ³¹P MAS-NMR analyses were carried out on multi-component Li₂O-SiO₂-ZnO-Na₂O-P₂O₅-B₂O₃ glasses and glass-ceramics developed for sealing application. Structural data are reported, including phase separation process and quantification of amorphous and crystalline phases.

On the correct spin lattice for the spin-gapped magnetic solid NH₄CuPO₄ · H₂O

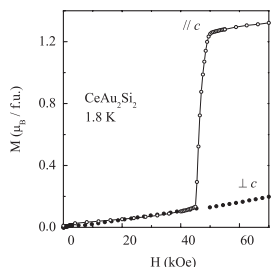
Hyun-Joo Koo and Myung-Hwan Whangbo
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The quantitative mapping analysis based on the present GGA + U calculations indicates that the magnetic properties of NH₄CuPO₄ · H₂O should be described by an AF-F alternating chain model, although an isolated AFM dimer model has been considered to be correct.

Crystal structures and magnetic properties of CeAu_4Si_2 and CeAu_2Si_2

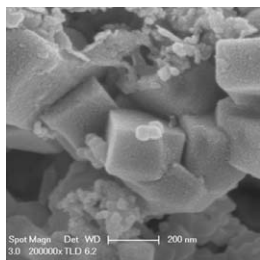
Athena S. Sefat, Andriy M. Palasyuk, Sergey L. Bud'ko, John D. Corbett and Paul C. Canfield
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The magnetization versus applied field for CeAu_2Si_2 along two crystallographic directions.

A low-temperature route for the synthesis of nanocrystalline LaB_6

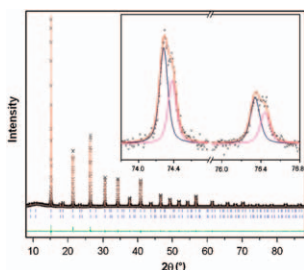
Maofeng Zhang, Liang Yuan, Xiaoqing Wang, Hai Fan, Xuyang Wang, Xueying Wu, Haizhen Wang and Yitai Qian
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Nanocrystalline lanthanum hexaboride (LaB_6) with mean particle size of 30 nm has been successfully synthesized at 400°C in an autoclave starting from NaBH_4 , LaCl_3 and metallic magnesium powder. In this case, by using B_2O_3 instead of NaBH_4 , LaB_6 nanocubes with mean size of ~ 200 nm were formed at 500°C . In comparison with previous routes, the present route allows for the formation of nanocrystalline LaB_6 through a simpler process and at a much lower synthesis temperature.

Phase segregation in mixed Nb–Sb double perovskites $\text{Ba}_2\text{LnNb}_{1-x}\text{Sb}_x\text{O}_6$

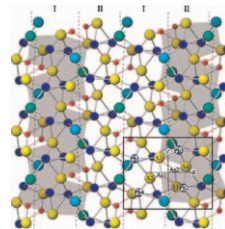
Paul J. Saines and Brendan J. Kennedy
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The incompatibility of Sb and Nb in single-phase perovskites is explored for two families of oxides, namely $\text{Ba}_2\text{EuNbO}_6$ – $\text{Ba}_2\text{PrSbO}_6$ and $\text{Ba}_2\text{NdSbO}_6$ – $\text{Ba}_2\text{NdNbO}_6$. Limited solubility of Sb^{5+} in these Nb^{5+} perovskites is observed, irrespective of their precise structure. This is apparently a consequence of competing bonding requirements of the Nb^{5+} and Sb^{5+} cations.

Ordered distribution of I and Cl in the low-temperature crystal structure of mutnovskite, $\text{Pb}_4\text{As}_2\text{S}_6\text{ICl}$: An X-ray single-crystal study

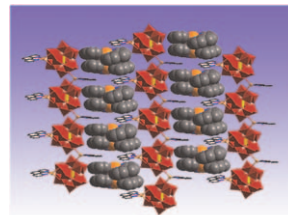
Luca Bindi, Anna Garavelli, Daniela Pinto, Giovanni Pratesi and Filippo Vurro
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In the crystal structure of mutnovskite at 110 K the two halogens I and Cl are ordered into two specific sites and only slight changes in the coordination environment around Pb atoms occur during the phase transition $Pnma \rightarrow Pnm2_1$ from the RT-structure to the LT-structure. Two kinds of layers alternating along **a** are present in the LT-structure: Layer I contains Cl atoms and [001] columns of Pb1 and Pb4 prisms, layer II contains I atoms and [001] columns of Pb2 and Pb3 prisms.

Synthesis, structure and luminescent property of a new hybrid solid based on Keggin anions and silver-organonitrogen fragments

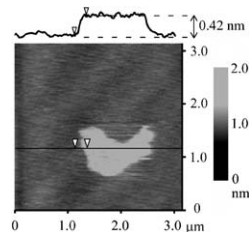
Jian Lü, Fu-Xian Xiao, Lin-Xi Shi and Rong Cao
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A novel hybrid solid, $\{\text{Ag}(\text{phen})_2\}_2\{\text{[Ag}(\text{phen})_2\text{][PMO}_{12}\text{O}_{40}]\}$ (phen = 1,10-phenanthroline) **1**, is reported. In the structure of **1**, $\{\text{Ag}(\text{phen})[\text{PMO}_{12}\text{O}_{40}]\}^{3-}$ polyanions are connected by $\{\text{Ag}(\text{phen})\}^+$ fragments to form a hybrid chain structure. $\{\text{Ag}(\text{phen})_2\}^+$ counter-cations are involved in inter-chain π – π stacking to form a three-dimensional supramolecular framework. Luminescent investigation of **1** indicates that **1** displays fascinating orange luminescent property at ambient temperature.

A new approach for the synthesis of layered niobium sulfide and restacking route of NbS_2 nanosheet

Kazuyoshi Izawa, Shintaro Ida, Ugur Unal, Tomoki Yamaguchi, Joo-Hee Kang, Jin-Ho Choy and Yasumichi Matsumoto
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Potassium-intercalated layered niobium sulfide has been synthesized by heating a corresponding layered niobate in a $\text{H}_2\text{S}/\text{N}_2$ mixture gas. Proton-exchanged layered niobium sulfide has been exfoliated into NbS_2 mono-nanosheet. The NbS_2 mono-nanosheet was restacked with cationic species by an electrostatic self-assembly deposition.

The influence of phase and morphology of molybdenum nitrides on ammonia synthesis activity and reduction characteristics

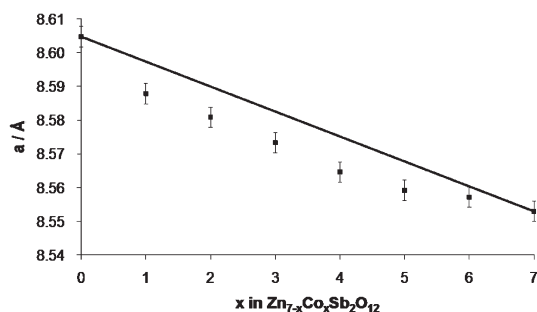
D. McKay, J.S.J. Hargreaves, J.L. Rico, J.L. Rivera and X.-L. Sun
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Nanorod γ -Mo₂N.

Crystal chemistry of Co-doped Zn₇Sb₂O₁₂

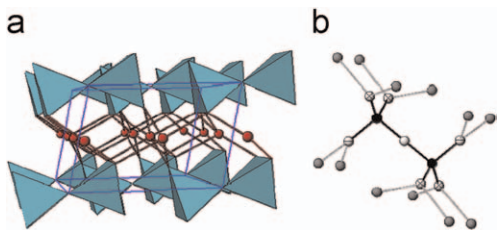
Richard Harrington, Gabrielle C. Miles and Anthony R. West
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Zn₇Sb₂O₁₂ forms a full range of Co-containing α solid solutions, Zn_{7-x}Co_xSb₂O₁₂, with an inverse-spinel structure at high temperature. From the Rietveld refinement using ND data, Co occupies both octahedral and tetrahedral sites at intermediate values of x, but an octahedral preference attributed to crystal field stabilisation, causes the lattice parameter plot to deviate negatively from the Vegard's law.

Getting more out of X₂T₂O₇ compounds with thortveitite structure: The bond-valence model

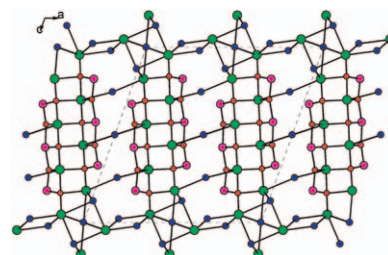
M.D. Alba, A.I. Becerro, P. Chain, A. Escudero and T. Gonzalez-Carrascosa
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T-O bridging distance and mean T-O distance are linearly correlated to the total atomic valence of the bridging oxygen and the silicon, respectively, and they are a function of the principal quantum number (*n*) of the valence shell of the atom T.

Syntheses, crystal structures and optical properties of the first strontium selenium(IV) and tellurium(IV) oxychlorides: Sr₃(SeO₃)(Se₂O₅)Cl₂ and Sr₄(Te₃O₈)Cl₄

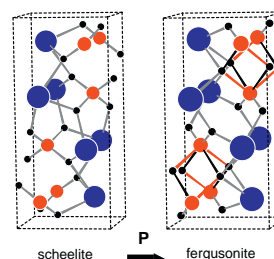
Hai-Long Jiang and Jiang-Gao Mao
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Solid-state reactions of SrO, SrCl₂, and SeO₂ or TeO₂ in different molar ratios and under different temperatures lead to two new strontium selenium(IV) or tellurium(IV) oxychlorides with two different types of structures, namely, Sr₃(SeO₃)(Se₂O₅)Cl₂ and Sr₄(Te₃O₈)Cl₄. Both compounds are wide band-gap semiconductors based on the diffuse reflectance spectra and the electronic band structures.

High-pressure X-ray diffraction study of SrMoO₄ and pressure-induced structural changes

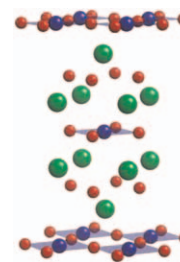
Daniel Errandonea, Ravhi S. Kumar, Xinghua Ma and Chaoyang Tu
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The evolution of the structure of SrMoO₄ upon compression was established using synchrotron X-ray diffraction and a diamond-anvil cell. A pressure-induced phase transition was found involving a symmetry decrease from tetragonal to monoclinic. A transition mechanism is proposed and its ferroelastic character is discussed in terms of the Landau theory.

Conditions for superconductivity in the electron-doped copper-oxide system, (Nd_{1-x}Ce_x)₂CuO_{4+δ}

Y. Tanaka, T. Motohashi, M. Karppinen and H. Yamauchi
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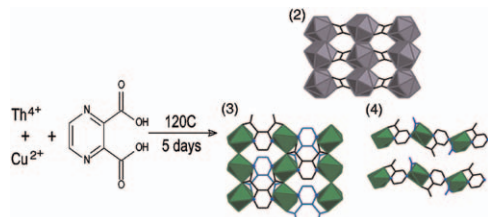
Superconductivity in the electron-doped (Nd_{1-x}Ce_x)₂Cu_{1-y}O_{4+δ} system is sensitively controlled not only by the Ce^{IV}-for-Nd^{III} substitution level (*x*) but also by the Cu-vacancy concentration (*y*) and the oxygen content (δ) determined by oxygen-partial pressure used for the post-annealing.

Continued

Hydrothermal chemistry of Th(IV) with aromatic dicarboxylates: New framework compounds and *in situ* ligand syntheses

Kate L. Ziegelgruber, Karah E. Knope, Mark Frisch and Christopher L. Cahill

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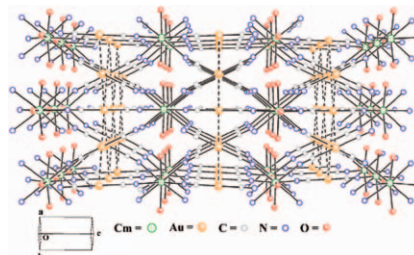


3,5-Pyrazoledicarboxylic and 2,3-pyridinedicarboxylic acid were utilized in synthesizing two novel thorium (IV) coordination polymers. Attempts to synthesize a Th–Cu bimetallic compound with 2,3-pyridinedicarboxylic acid resulted in a triphasic mixture (2, 3 and 4, respectively). The oxalate anion observed in $\text{Th}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2 \cdot 2\text{H}_2\text{O}$ (2) is theorized to result from decarboxylation of 2,3-pyridinedicarboxylic acid as supported by the organic linker, 2-pyrazinecarboxylate, observed in $\text{Cu}(\text{C}_5\text{H}_3\text{N}_2\text{O}_2)(\text{NO}_3)(\text{H}_2\text{O})$ (4).

Hydrothermal syntheses, structural, Raman, and luminescence studies of $\text{Cm}[M(\text{CN})_2]_3 \cdot 3\text{H}_2\text{O}$ and $\text{Pr}[M(\text{CN})_2]_3 \cdot 3\text{H}_2\text{O}$ ($M = \text{Ag}, \text{Au}$) 2. Hetero-bimetallic coordination polymers consisting of trans-plutonium and transition metal elements

Zerihun Assefa, Richard G. Haire and Richard E. Sykora

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Coordination polymeric compounds between a trans-plutonium element, curium and transition metal ions, gold(I) and silver(I), were prepared using the hydrothermal synthetic procedure. The curium ion and the transition metals are interconnected through cyanide bridging. The Cm ion has a tricapped trigonal prismatic coordination environment with coordination number of nine. Detail photoluminescence studies of the complexes are also reported.

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