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## RARE EARTH APPLICATIONS

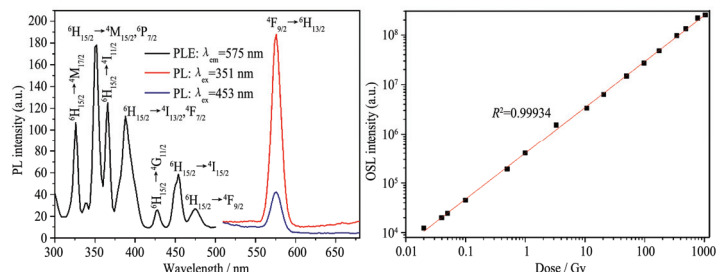
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SPECTROSCOPY, LUMINESCENCE AND PHOSPHORS

927 Optically stimulated luminescence of Dy<sup>3+</sup>-doped NaCaPO<sub>4</sub> glass-ceramics

Jie Xu, Zhaoyang Chen\*, Minqiang Gai, Yanwei Fan, Chengfa He



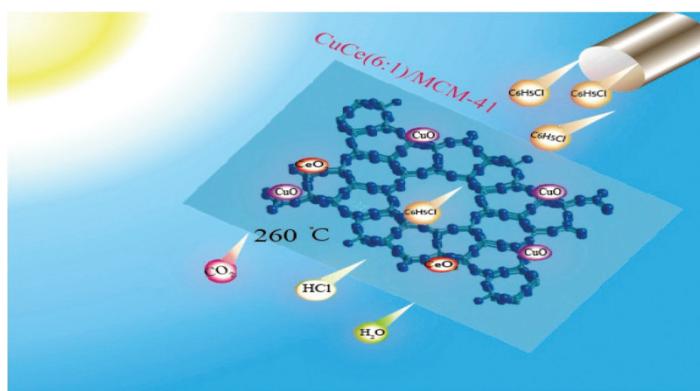
The excitation spectrum of the Dy<sup>3+</sup>-doped NaCaPO<sub>4</sub> glass-ceramics exhibits several characteristic excited peaks at 326 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>M<sub>17/2</sub>), 351 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>M<sub>15/2</sub>, <sup>6</sup>P<sub>7/2</sub>), 366 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>I<sub>11/2</sub>), 389 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>I<sub>13/2</sub>, <sup>4</sup>F<sub>7/2</sub>), 428 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>G<sub>11/2</sub>), 454 (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>I<sub>15/2</sub>) and 475 nm (<sup>6</sup>H<sub>15/2</sub> → <sup>4</sup>F<sub>9/2</sub>). The emission spectrum of the sample by exciting the wavelength with 351 nm shows one bands centered at 575 nm due to the transitions of the Dy<sup>3+</sup> ions: <sup>4</sup>F<sub>9/2</sub> → <sup>6</sup>H<sub>13/2</sub>. The dose response is quite linear in the range (0.02–1000 Gy) with r<sup>2</sup> equal to 0.99934

J. Rare Earths, (38) 2020: 927-932

RARE EARTH CATALYSIS

933 MCM-41 supported nano-sized CuO-CeO<sub>2</sub> for catalytic combustion of chlorobenzene

Jie Zheng, Zhu Chen, Jianfei Fang, Zhuo Wang, Shufeng Zuo\*

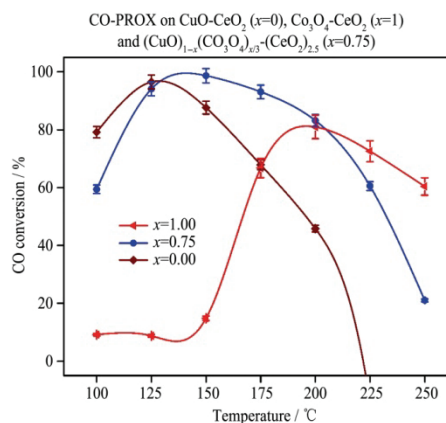


In this paper, MCM-41 and CuO-CeO<sub>2</sub> nano-sized catalysts were synthesized by a soft template technique and deposition-precipitation method. 10% CuCe (6:1)/MCM-41 has the highest activity and good durability for CB combustion, which could completely catalyze the degradation of CB at 260 °C

J. Rare Earths, (38) 2020: 933-940

941 Influence of cobalt on performance of Cu-CeO<sub>2</sub> catalysts for preferential oxidation of CO

Sachin Malwadkar\*\*, Parthasarathi Bera\*, C.V.V. Satyanarayana

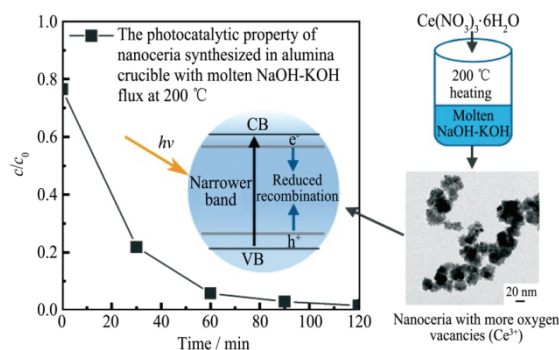


Addition of Co in Cu-CeO<sub>2</sub> catalyst enhances preferential oxidation of CO with wide temperature window because of synergistic interaction among Cu<sup>2+</sup>/Cu<sup>+</sup>, Co<sup>3+</sup>/Co<sup>2+</sup> and Ce<sup>4+</sup>/Ce<sup>3+</sup> redox couples present on the catalyst surface

J. Rare Earths, (38) 2020: 941-950

951 Facile synthesis of nanoceria by a molten hydroxide method and its photocatalytic properties

Xuwen Xia, Yuanpei Lan\*, Junqi Li\*\*,  
Chaoyi Chen, Benjun Xu, Xian Luo,  
Xisong Mao



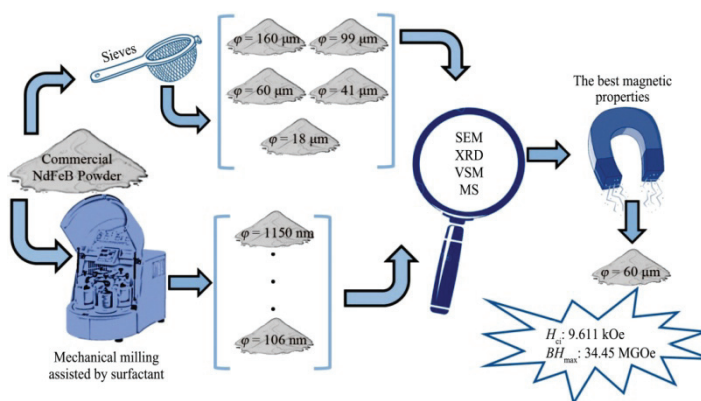
The nanoceria synthesized in alumina crucible with NaOH-KOH flux at 200 °C owns better photocatalytic property due to the narrower band gap and reduced recombination rate of electrons and holes

*J. Rare Earths*, (38) 2020: 951-960

### MAGNETISM AND MAGNETIC MATERIALS

961 Systematic study of the dependence of magnetic and structural properties of Nd<sub>2</sub>Fe<sub>14</sub>B powders on the average particle size

J.F. Durán Perdomo, G.A. Pérez Alcázar\*,  
H.D. Colorado, J.A. Tabares, L.E. Zamora,  
J.J.S. Garitaonandia

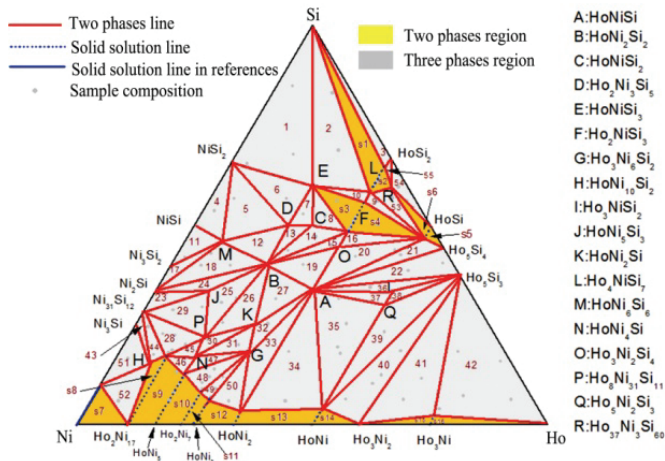


Preparation of the Nd<sub>2</sub>Fe<sub>14</sub>B powders

*J. Rare Earths*, (38) 2020: 961-968

969 Investigation on the 773 K isothermal section of Ho-Ni-Si ternary phase diagram by X-ray powder diffraction and magnetic property of Ho<sub>3</sub>NiSi<sub>2</sub> alloy

Xiang Chen\*, Jixin Gong, Jiaojiao Luo,  
Wenxuan Yang, Xian Qing



The Ho-Ni-Si ternary isothermal section phase diagram at 773 K

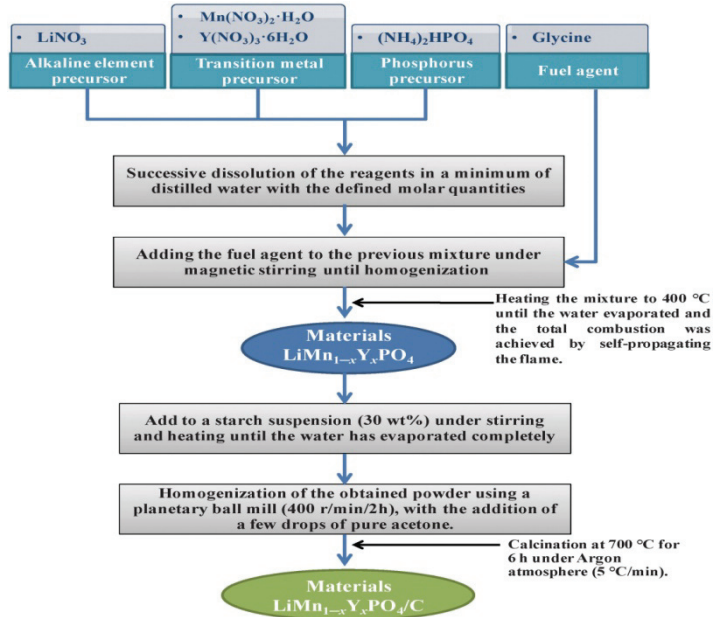
*J. Rare Earths*, (38) 2020: 969-975



ADVANCED RARE EARTH MATERIALS

976 Solution combustion synthesis and electrochemical properties of yttrium-doped  $\text{LiMnPO}_4/\text{C}$  cathode materials for lithium ion batteries

Redouan El Khalfaouy\*, Servet Turan, Miguel A. Rodriguez, Kamil Burak Dermenci, Umut Savaci, Abdellah Addaou, Ali Laajeb, Ahmed Lahsini

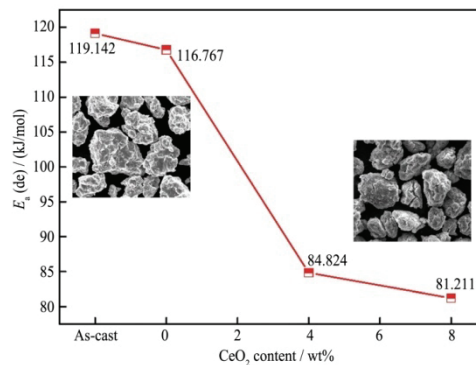


Solution combustion synthesis process of  $\text{LiMn}_{1-x}\text{Y}_x\text{PO}_4/\text{C}$  cathode materials ( $x = 0, 0.01, 0.03, 0.05$ ). Yttrium was successfully incorporated into the  $\text{LiMnPO}_4$  host material structure, which can enhance its structural stability by improving ion transfer efficiency during charge/discharge process

*J. Rare Earths*, (38) 2020: 976-982

983 Enhanced hydrogen storage performance of Mg-Cu-Ni system catalyzed by  $\text{CeO}_2$  additive

Yi Yin, Bo Li, Zeming Yuan, Yan Qi, Yanghuan Zhang\*



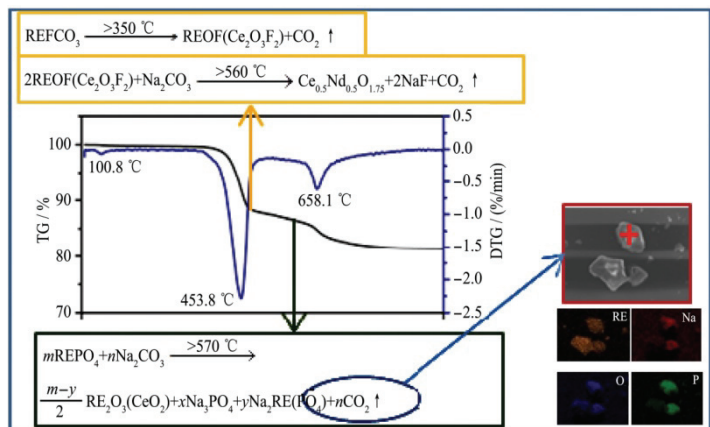
During hydriding and dehydriding, the cracks and defects formed on the  $\text{CeO}_2$  catalyzed alloys particles enhance hydrogen storage kinetics

*J. Rare Earths*, (38) 2020: 983-993

CHEMISTRY AND HYDROMETALLURGY

994 Thermal decomposition mechanism of low-content-fluorite Bayan Obo rare earth concentrate roasted with sodium carbonate and its consequent separation study

Dan Zou, Ji Chen\*, Jiashi Hu, Kai Li, Deqian Li

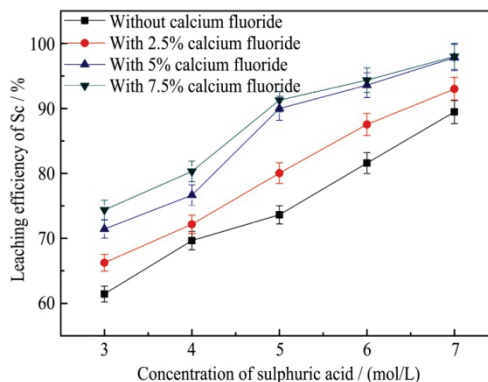


Thermal decomposition mechanism of Bayan Obo RE concentrate with low-content fluorite calcined with sodium carbonate and its technology study were investigated in this paper. During the calcination process, BORC, consisting of bastnaesite and monazite, is decomposed and transformed into  $\text{Ce}_{0.5}\text{Nd}_{0.5}\text{O}_{1.75}$ ,  $\text{NaF}$ ,  $\text{Na}_3\text{PO}_4$ , and a rare earth double phosphate phase  $\text{Na}_3\text{RE}(\text{PO}_4)_2$

*J. Rare Earths*, (38) 2020: 994-1002

1003 Extraction of scandium from red mud by acid leaching with  $\text{CaF}_2$  and solvent extraction with P507

Xiaobo Zhu, Wang Li\*, Baolin Xing, Yude Zhang

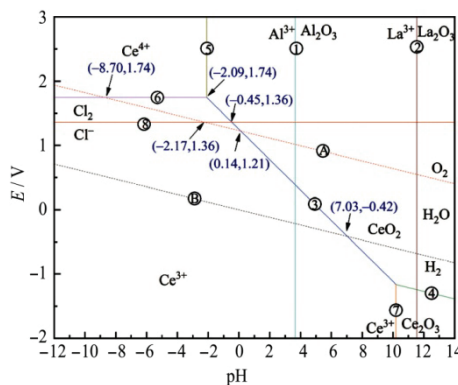


The  $\text{CaF}_2$  can obviously improve the leaching efficiency of Sc and reduce the acid consumption. The leaching efficiency of Sc is 70%, 78%, 90%, and 92%, respectively with 0, 2.5%, 5%, and 7.5% of  $\text{CaF}_2$  at 5 mol/L  $\text{H}_2\text{SO}_4$ . Furthermore, the leaching efficiency of Sc also increases with an increase of  $\text{H}_2\text{SO}_4$  concentration at the same amount of  $\text{CaF}_2$

J. Rare Earths, (38) 2020: 1003-1008

1009 Kinetics study on leaching of rare earth and aluminum from polishing powder waste using hydrochloric acid

Xitao Wu\*, Zhijian Wang, Chuping Xia, Xuefeng Shi, Tianzong Luo, Xinjun Bao, Rongli Liu, Shengzhong Xie\*\*

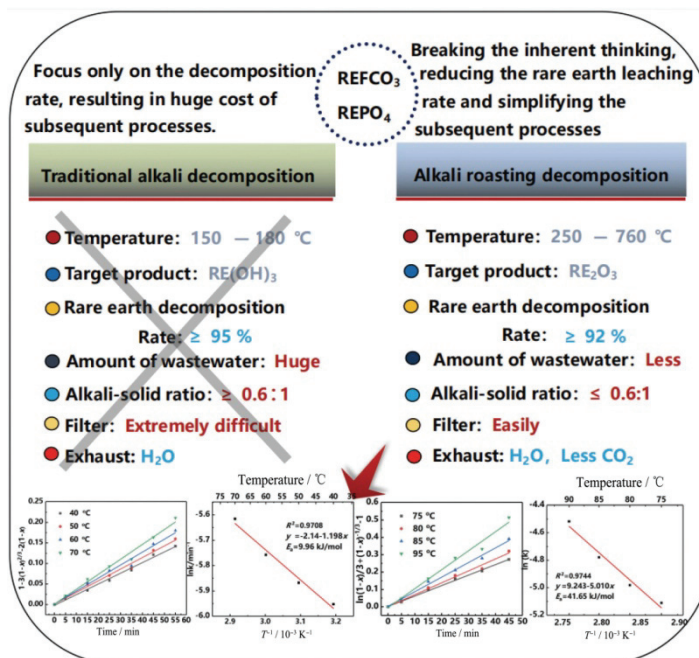


$\text{CeO}_2$  and  $\text{HCl}$  may react as follows:  $4\text{CeO}_2 + 12\text{HCl} = 4\text{CeCl}_3 + \text{O}_2 + 6\text{H}_2\text{O}$

J. Rare Earths, (38) 2020: 1009-1018

1019 Decomposition of mixed rare earth concentrate by  $\text{NaOH}$  roasting and kinetics of hydrochloric acid leaching process

Mei Li\*, Jianfei Li, Dongliang Zhang, Kai Gao, Huihui Wang, Wei Xu, Jinlong Geng, Xiaoyan Zhang, Xiufen Ma



A smelting method for clean extraction of Bayan Obo mixed rare earth concentrate is reported. The reaction process is strengthened by optimizing the reaction mechanism, regulating the phase structure of the product, and increasing the reaction temperature. Therefore, it fundamentally overcomes a series of technical problems such as difficulty in traditional alkali decomposition and filtration, a large amount of water washing, and easy occurrence of "splashing" accidents. It has important practical significance and research value for the realization of the clean extraction of rare earth resources and associated elements of Bayan Obo

J. Rare Earths, (38) 2020: 1019-1029

RARE EARTH APPLICATIONS

1030 Effect of titanium and rare earth microalloying on microsegregation, eutectic carbides of M2 high speed steel during ESR process

Fuxing Yin, Lu Wang, Zhixia Xiao\*, Jianhang Feng, Lin Zhao

J. Rare Earths, (38) 2020: 1030-1038

Alloy no.	Element segregation	Element segregation				
		C	W	Cr	Mo	V
M2	$C_d$	0.10	3.60	3.36	2.84	1.51
	$k(= \frac{C_d}{C_l})$	<b>0.18</b>	<b>0.76</b>	<b>0.77</b>	<b>0.57</b>	<b>0.61</b>
M2RE	$C_d$	0.13	3.20	3.70	3.08	1.53
	$k(= \frac{C_d}{C_l})$	<b>0.62</b>	<b>1.01</b>	<b>0.87</b>	<b>0.95</b>	<b>1.03</b>
M2Ti	$C_d$	0.13	3.90	3.40	2.90	1.50
	$k(= \frac{C_d}{C_l})$	<b>0.80</b>	<b>1.01</b>	<b>0.93</b>	<b>0.95</b>	<b>0.97</b>
M2RETi	$C_d$	0.30	3.85	3.26	2.85	1.55
	$k(= \frac{C_d}{C_l})$	<b>0.55</b>	<b>0.88</b>	<b>0.78</b>	<b>0.70</b>	<b>0.76</b>

*In-situ* Ti microalloying during ESR significantly reduces dendritic segregation of M2 high speed steel, and changes the morphology of  $M_2C$  carbides from rod-like or maze-like to coarse feathery shape. *In-situ* Ti and RE composite microalloying improves the feather-like  $M_2C$  carbides, making them thinner and shorter, and tends to be isolated or distributed in a discontinuous network