

The thermocatalytic, photocatalytic and photothermo-catalytic oxidation of some volatile organic compounds (VOCs), 2-propanol, ethanol and toluene, was investigated over brookite TiO₂-CeO₂ composites. The multi-catalytic approach based on the synergistic effect between solar photocatalysis and thermocatalysis led to the considerable decrease in the conversion ...

In this review, the recent developments of TiO₂ polymorphs with different crystalline structures (such as rutile, anatase, and bronze) as electrode materials for energy storage systems were summarized, which is outlined in Scheme 1. This review is centered on the recent research progress of TiO₂ with various morphologies in the fields of batteries, including 0D ...

The digital diffraction pattern (DDP) obtained from the corresponding image is also shown. 168 B.M. Reddy and A. Khan/Influence of SiO₂, TiO₂, and ZrO₂ on ceria Figure 8. TEM images of CeO₂-TiO₂ sample calcined at (a) 773 K and (b) 1073 K. Figure 9. HREM image of CeO₂-TiO₂ sample calcined at 1073 K.

Oxygen storage materials in catalysis have wide applications because they not only possess OSC but also influence various catalytic properties. In fact, reducible oxides act as O₂ reservoirs, and this can be ...

This technique offers a layer-by-layer fabrication route for ultrathin CeO_{2-x} films that render Ce³⁺ concentrations as high as ~60 at% and a volumetric capacitance of 1873 F cm⁻³, which is...

Among the different types of energy storage devices, ... In-situ electrochemical route to aerogel electrode materials of graphene and hexagonal CeO₂. J. ... X. H. et al. Hydrogenated TiO₂ nanotube ...

Two-dimensional (2D) mesoporous materials (2DMMs), defined as 2D nanosheets with randomly dispersed or orderly aligned mesopores of 2-50 nm, can synergistically combine the fascinating merits of 2D materials and mesoporous materials, while overcoming their intrinsic shortcomings, e.g., easy self-stacking of 2D materials and long ion transport paths in bulk ...

Request PDF | Particle stability investigation of Mn-Fe oxides supported by TiO₂, ZrO₂ or CeO₂ as thermochemical energy storage materials | Thermo-chemical materials have a higher energy density ...

DOI: 10.1016/j.jics.2024.101400 Corpus ID: 273029122; Development, Characterization and Thermo-physical Analysis of Energy Storage Material Doped with TiO₂ and CuO Nano-Additives

The role of interface contact between two oxides, CeO₂ and TiO₂, for the photocatalytic elimination of toluene is examined in a series of samples with variable quantities of ceria.

TiO₂/CeO₂ composite catalysts were successfully prepared with hydrothermal and deposition-precipitation method. Acquired samples were characterized with diversiform analytical techniques and spectroscopy to ensure their structure, morphology, and light absorption properties. The results manifest that all the samples contain highly crystalline anatase phase. ...

The electrode materials Co₃O₄-CeO₂/AC were used to fabricate asymmetric supercapacitor devices with an exceptional energy density of 54.9 W h kg⁻¹ and a power density of 849.9 W h kg⁻¹. In reality, the energy density was effective at a power density of roughly ...

These findings support the possibility of these composites for practical applicability as electrode materials in energy storage devices. ... Au/CeO₂-TiO₂ has been found to be a very effective ...

Nanostructured materials possess unique physical-chemical characteristics and have attracted much attention, among others, in the field of energy conversion and storage devices, for the possibility to exploit both their bulk and surface properties, enabling enhanced electron and ion transport, fast diffusion of electrolytes, and consequently high efficiency in the ...

The response of the sensor has been proved to only deteriorate little during a long-term monitoring. Compared with the Pt-TiO₂ material, the CeO₂-TiO₂ composite material significantly reduces the response time from 300s to 70 s. The enhanced sensing mechanism can be attributed to the CeO₂ n-n contact electron transfer and energy bending.

TiO₂/CeO₂ nanocomposites of anatase TiO₂ nanoparticles supported on microsized mesoporous CeO₂ were prepared and characterized by SEM, TEM, BET, XRD, Raman, XPS, and diffuse reflectance UV-vis absorption. The formation of the TiO₂/CeO₂ nanocomposites considerably enhances their catalytic activity for the gas-phase oxidation of ...

The direct discharge of industrial wastewater into the environment results in serious contamination. Photocatalytic treatment with the application of sunlight and its enhancement by coupling with electrocatalytic degradation offers an inexpensive and green technology enabling the total removal of refractory pollutants such as surfactants, pharmaceuticals, pesticides, ...

Cerium dioxide (CeO₂, ceria) has long been regarded as one of the key materials in modern catalysis, both as a support and as a catalyst itself. ... In the various photocatalyst semiconductors, TiO₂, CdS, ZnO, MoP, g-C₃N₄, etc., have been extensively investigated (Zhao et al., 2020). ... Energy Storage Mat. 10, 216-222. doi:10.1016/j.ensm ...

The energy gap E_g between the valence and conduction bands is a key characteristic of semiconductors. Semiconductors, such as TiO₂, SnO₂, and CeO₂ have a relatively wide band gap E_g that only allows the material to absorb UV light. Using the s-d microscopic model and the Green's function method, we have shown two possibilities to ...

Abstract Photocatalysis has the advantages of practical, sustainable and environmental protection, so it plays a significant role in energy transformation and environmental utilization. CeO₂ has at...

SC operates on the idea of energy storage and distribution of ions from the electrolyte to the surface area of the electrodes, which is based on their interaction with the electrolyte. ... Cerium/PANI/Fe₃O₄, CeO₂/PANI/TiO₂, CeO₂/PANI/TiO₂ nanotube arrays employing synthesis procedures such as solution mixing ... CNT composited CeO₂ ...

@article{Sun2019ThermochemicalES, title={Thermochemical energy storage performances of Ca-based natural and waste materials under high pressure during CaO/CaCO₃ cycles}, author={Hao Chun Sun and Yingjie Li and Zhiguo Bian and Xianyao Yan and Zeyan Wang and Wenqiang Liu}, journal={Energy Conversion and Management}, year={2019}, ...

We determine chemical origins of increase in the reducibility of CeO₂ upon Ti substitution using a combination of experiments and first-principles density functional theory calculations. Ce_{1-x}Ti_xO₂ (x = 0.0-0.4) prepared by a single step solution combustion method crystallizes in a cubic fluorite structure, confirmed by Rietveld profile analysis.

(TiO₂), (CeO₂) films and their nanocomposites (TiO₂)_{1-x}(CeO₂)_x were deposited at ratios of x (0.2,0.4,0.6,0.8wt) on the glass substrates using Pulse Laser Deposition technique (PLD). Many growth parameters have been considered to specify the optimum condition, namely substrate temperature (50-176°C), laser energy (700) mJ and the number of ...

DOI: 10.1080/01614940.2022.2162677 Corpus ID: 256587754; CeO₂-based oxygen storage capacity materials in environmental and energy catalysis for carbon neutrality: extended application and key catalytic properties

This article reviews the applications of REs in traditional metallurgy, biomedicine, magnetism, luminescence, catalysis, and energy storage, where it is surprising to discover the infinite ...

RGO-Ba(OH)₂/CeO₂/TiO₂. Energy storage and conversion. In this investigation, we synthesized a novel quaternary nanocomposite, denoted as RGO-Ba(OH)₂/CeO₂/TiO₂, through a straightforward and cost-effective solid.

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