



## Boron nitride nanotubes: A review of recent progress on purification methods and techniques

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Boron nitride nanotubes (BNNTs) could be the next big leap for nanocomposite advanced applications; however, significant scientific challenges must be addressed. The authors synthesize relevant literature and state-of-the-art techniques regarding purification methods of BNNTs, classified as physical, chemical, and multistep techniques and their applications. The authors also discuss BNNT synthesis methods and future research directions. <https://doi.org/10.1557/s43578-022-00672-5>

## Ultrawide-bandgap semiconductors: An overview

Man Hoi Wong, Oliver Bierwagen, Robert J. Kaplar, Hitoshi Umezawa

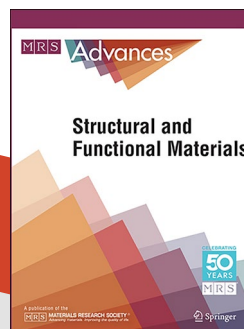
Ultrawide-bandgap (UWBG) semiconductor technology is presently going through a renaissance exemplified by advances in material-level understanding, extensions of known concepts to new materials, novel device concepts, and new applications. The authors consolidate the fundamentals and background of key UWBG semiconductors including aluminum gallium nitride alloys, boron nitride, diamond,  $\beta$ -phase gallium oxide, and a number of other UWBG binary and ternary oxides. <https://doi.org/10.1557/s43578-021-00458-1>

## Revisiting Cu-based shape memory alloys: Recent developments and new perspectives

E.M. Mazzer, M.R. da Silva, P. Gargarella

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Cu-based shape memory alloys belong to one important class of functional alloys, presenting shape memory effect and superelasticity due to their reversible martensitic transformation. The authors discuss the advances in the general fundamentals of Cu-based shape memory alloys and recent developments in processing routes, compositions, and applications. <https://doi.org/10.1557/s43578-021-00444-7>



## Structural incorporation of lanthanides (La, Eu, and Lu) into $U_3O_8$ as a function of the ionic radius

Shannon Kimberly Potts, Philip Kegler, Giuseppe Modolo, Simon Hammerich, Irmgard Niemeyer, Dirk Bosbach, Stefan Neumeier

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The authors focus on creating precise microparticulate reference materials for accurate particle and mass spectrometric analyses. Initial steps involved fabricating lanthanide/uranium oxide microparticles, a crucial milestone toward composite references featuring trace fission products. Investigations of bulk-scale comparison materials via energy-dispersive x-ray spectroscopy, thermogravimetric technique, and Raman provided essential data, paving the way for optimizing the production process to craft meticulously defined mixed-oxide microparticles, advancing analytical capabilities. <https://doi.org/10.1557/s43580-022-00226-1>

## Effect of thermal annealing on aggregation of a squaraine thin film

Zachary S. Walbrun, Laura C. Leibfried, Áine R. Hoban, Brandon C. Rasmussen, Tyler J. Wiegand, Christopher J. Collison, Cathy Y. Wong

The authors explore thermal annealing's impact on squaraine molecules in a poly(methyl methacrylate) film. *In situ* absorption measures molecular aggregation, while spatially encoded transient absorption spectroscopy tracks excited state dynamics. Initial linear absorbance suggests weakly coupled squaraine molecules, yet a kinetic model reveals pre-existing pi-stacked aggregates. Thermal annealing enhances these aggregates, resulting in more excitons within a few picoseconds. <https://doi.org/10.1557/s43580-022-00215-4>

## Crystal growth and characterization of $RhPb_2$ and its related compounds

Nikola Subotić, Takashi Mochiku, Yoshitaka Matsushita, Osamu Takeuchi, Takanari Kashiwagi, Hidemi Shigekawa, Kazuo Kadowaki.

The authors report on the single-crystal intermetallic compound  $RhPb_2$ , its x-ray diffraction study, and the phase stability analysis exploring the possibility of the compound being a topological superconductor. The different temperatures for superconductivity due to missing Rh atoms suggest a possible pattern in vacancies despite the same structure. <https://doi.org/10.1557/s43580-022-00292-5>