



Yi-Bing Cheng

Professor of Materials Engineering
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and Engineering



Diploma in Silicate Materials, Wuhan Univ. of Tech., China, 1978
MEng in Inorganic Materials, Wuhan Univ. of Tech., China, 1983
PhD in Ceramics, Univ. of Newcastle-on-Tyne, UK, 1989
Consultant Professor, Huazhong University of Science and Technology, China
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RESEARCH INTERESTS

Professor Cheng specialises in inorganic materials and composites. His research interests in this area span a wide range of topics in synthesis of nano materials, ceramic processing, microstructure development and materials applications in aggressive conditions. He has particular interests in the development of non-oxide ceramics and composites, especially sialons.

Since 2001, Dr Cheng has been involved in the research of nano-TiO₂ based dye sensitised solar cells (DSSCs). His work in this area mainly lies in the development of nanostructured working and counter electrodes, and construction of solar cell devices. He has special interests in the engineering aspects of the DSSC technology. In recent years, he has made focused efforts in the development of flexible DSSCs on plastic substrates and processing of DSSCs by printing technologies.

He is a chief investigator of the novel ceramic-polymer composites for fire-performance cable applications in the Cooperative Research Centre for Polymers. This award-winning technology has been commercialised by an Australian company.

TEACHING

Mechanical Properties of Materials
Ceramic Technology
Engineering Ceramics
Glass and Glass-Ceramics

SELECTED PUBLICATIONS

Ceramics

1. K.Wang, J.Yao, H.Wang and Y.-B.Cheng, Effect of seeding on formation of silicon carbide nanostructures from mesoporous silica-carbon nanocomposites, *Nanotechnology*, 19(17)175605, 8 pages, 2008
2. M.Hotta, J.Tatami, K.Komeya, C.Zhang, T.Meguro, M.R.Terner, Y.B.Cheng, Formation process of calcium-alpha SiAlON hollow balls composed of nanosized particles by carbothermal reduction-nitridation, *Journal of the American Ceramic Society*, 91(3)860-864, 2008
3. J. Yao, H. Wang, X. Zhang, W. Zhu, J. Wei, Y.-B. Cheng, Role of pores in the carbothermal reduction of carbon-silica nanocomposites into silicon carbide nanostructures, *J. of Phys. Chem. C*, 111 (2)636-641, 2007
4. J. Mansouri¹, C. Wood, K. Roberts, Y.-B. Cheng, and R. Burford, Investigation of the ceramifying process of modified silicone-silicate compositions, *Journal of Materials Science*, 42(15)6046-6055, 2007
5. L. Hanu, G. Simon, Y. B. Cheng, Thermal stability and flammability of silicone polymer composites, *Polymer Degradation and Stability*, 91(6)1373-1379, 2006
6. Z. -H. Xie, M. Hoffman, R. J. Moon, P. R. Munroe and Y. -B. Cheng, Sliding wear of calcium alpha-sialon ceramics, *Wear*, 260(4-5)387-400, 2006
7. A. Carman, E. Pereloma, Y. B. Cheng, Hot forging of a textured alpha-sialon ceramic, *Journal of the American Ceramic Society*, 89(2)478-483, 2006
8. Y. Zhang, Y. B. Cheng, S. Lathabai, K. Hirao, Erosion response of highly anisotropic silicon nitride, *Journal of the American Ceramic Society*, 88(1) 114-120, 2005
9. M. Hussain, R. Varely, Y. B. Cheng, Z. Mathys, G. P. Simon, Synthesis and thermal behavior of inorganic-organic hybrid geopolymer composites, *Journal of Applied Polymer Science*, 96(1) 112-121, 2005
10. Z. Q. Shen, G. P. Simon, Y. B. Cheng, Nanocomposites of poly(methyl methacrylate) and organically modified layered silicates by melt intercalation, *Journal of Applied Polymer Science*, 92(4) 2101-2115, 2004
11. A.J. Seeber, Y. B. Cheng, Thermal stability of mixed-cation α -sialon ceramics, *Materials Science and Engineering A*, 339(1-2) 115-123, 2003
12. O. Becker, Y. B. Cheng, R. J. Varley, G. P. Simon, Layered silicate nanocomposites based on various high-functionality epoxy resins: The influence of cure temperature on morphology, mechanical properties, and free volume, *Macromolecules*, 36(5) 1616-1625, 2003

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13. J. Habsuda, G. P. Simon, Y. B. Cheng, D. G. Hewitt, D. A. Lewis, H. Toh, Organic-inorganic hybrids derived from 2-hydroxyethylmethacrylate and (3-methacryloyloxypropyl)trimethoxysilane, *Polymer*, 43(15) 4123-4136, 2002
14. T. Bakharev, J. G. Sanjayan, Y. B. Cheng, Sulfate attack on alkali-activated slag concrete, *Cement and Concrete Research*, 32(2) 211-216, 2002

Dye Sensitised Solar Cells

1. Hongwei Han, Udo Bach, Yi-Bing Cheng, Rachel A. Caruso, Colin MacRae, A design for monolithic all-solid-state dye-sensitized solar cells with a platinized carbon counterelectrode, *Applied Physics Letters*, 94(10) 103102/1-103102/3, 2009
2. H.C.Weerasinghe, P.M. Sirimanne, G.P. Simon, Y.B. Cheng, Fabrication of efficient solar cells on plastic substrates using binder-free ball milled titania slurries, *Journal of Photochemistry and Photobiology A: Chemistry* 206, 64–70, 2009
3. S.A.Cerneaux, S.M.Zakeeruddin, M.Gratzel, Y.B.Cheng, L.Spiccia, New functional triethoxysilanes as iodide sources for dye-sensitized solar cells, *Journal of Photochemistry And Photobiology A-Chemistry*, 198, 2-3, 186-191, 2008
4. J. Hart, Y.-B. Cheng, G.P. Simon, L. Spiccia, Alternative materials and processing techniques for optimized nanostructures in dye-sensitized solar cells, *Journal of Nanoscience and Nanotechnology*, 8(5)2230-2248, 2008 (Review Article)
5. Andrew Nattestad, Michael Ferguson, Robert Kerr, Yi-Bing Cheng and Udo Bach, Dye-sensitized nickel(II)oxide photocathodes for tandem solar cell applications, *Nanotechnology* 19(29)295304 (9pp), 2008
6. N.A.Lewcenko, M.J.Byrnes, Y.B.Cheng, S.M.Zakeeruddin, M.Gratzel, L.Spiccia, Alkylpyrrolidiniumtrialkoxysilyl iodides as organic iodide sources for dye-sensitised solar cells, *Chemical Communications*, 33, 3852-3854, 2008
7. H. Han, U.Bach, and Y.-B. Cheng, R. Caruso, Increased nanopore filling: Effect on monolithic all-solid-state dye-sensitized solar cells, *Appl. Phys. Lett.* 90, 213510 (2007)
8. S. Cerneaux, S. Zakeeruddin, J. Pringle, Y.-B. Cheng, M. Gratzel, L. Spiccia, Novel nano-structured silica-based electrolytes containing quaternary ammonium iodide moieties, *Adv. Funct. Mater.*, 17(16)3200-3206, 2007
9. J.N. Hart, D. Menzies, Y. B. Cheng, G. Simon, L. Spiccia, Microwave processing of TiO₂ blocking layers for dye-sensitized solar cells, *Journal of Sol-Gel Science and Technology* 40(1)45-54, 2006
10. Fuzhi Huang, Meifang Zhou, Yi-Bing Cheng, and Rachel A. Caruso, Al-Containing Porous Titanium Dioxide Networks: Sol-Gel Synthesis within Agarose Gel Template and Photocatalytic Activity, *Chem. Mater.*, 18 (25), 5835 -5839, 2006

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11. D. Menzies, L. Bourgeois, Y.B. Cheng, G. Simon, L. Spiccia, Characterization of nanostructured core-shell working electrodes for application in dye-sensitized solar cells, *Surface & Coatings Technology*, 198(1-3)118-122, 2005
12. J.H. Hart, Y. B. Cheng, G. Simon, L. Spiccia, Challenges of producing TiO₂ films by microwave heating, *Surface & Coatings Technology*, 198(1-3)20-23, 2005
13. J. N. Hart, R. Cervini, Y. B. Cheng, G. P. Simon, L. Spiccia, Formation of anatase TiO₂ by microwave processing, *Solar Energy Materials and Solar Cells*, 84(1-4) 135-143, 2004
14. R. Cervini, Y. B. Cheng, G. Simon, Solid-state Ru-dye solar cells using polypyrrole as a hole conductor, *Journal of Physics D-Applied Physics*, 37(1) 13-20, 2004
15. D. Menzies, R. Cervini, Y. B. Cheng, G. Simon, L. Spiccia, Titanium isopropoxide post-treatment of titanium dioxide electrodes for use in dye-sensitised solar cells, *Journal of the Australasian Ceramic Society*, 39(2) 108-113, 2003