



## Dr. Zeng Kaiyang

Ph.D in Materials Science (KTH, Sweden)  
Associate Professor, Department of Mechanical  
Engineering, National University of Singapore,  
9 Engineering Drive 1, Singapore, 117576.

E-mail: [mpezk@nus.edu.sg](mailto:mpezk@nus.edu.sg);

Phone: (+65) 6516 6627; Fax: (+65) 6779 1459

Personal website: <http://me.nus.edu.sg/about-us/academic-groups/materials>

Group website: <https://sites.google.com/site/zengsresearchgroup/>



---

## MAJOR RESEARCH INTERESTS

- Functional Properties of Transitional Metal Oxide Thin Films;
- In-situ Characterization of Energy Storage Materials/Systems – Li-ion battery, thermoelectric materials etc.;
- Bioferroelectricity and biopiezoelectricity;
- Advanced Piezo/ferroelectric materials;
- Micromechanical properties of advanced materials;
- Advanced Scanning Probe Microscopy Characterization.

## SELECTED PUBLICATIONS

1. J.Zhu, L.Lu, K.Y.Zeng, Nanoscale mapping of Lithium-ion diffusion in a cathode within an all-solid-state lithium-ion battery by advanced scanning probe microscopy techniques, *ACS Nano*, 7, 1666-1675, 2013.
2. T.Li, L.Chen, K.Y.Zeng, In situ studies of nanoscale electromechanical behavior of nacre under flexural stresses using band excitation PFM, *Acta Biomaterialia*, 9, 5903-5912, 2013.
3. L.Chen, K.Y.Zeng, Y.-W.Zhang, C.M.She, G.R.Liu, A new approach to determine wedge-indented interfacial toughness in soft-film hard-substrate systems with application to low-k films on Si substrate, *Journal of Materials Research*, 27, 2872-2883, 2012.
4. Q.Q.ke, A.Kumar, X.J.Lou, K.Y.Zeng, J.Wang, Origin of the enhanced polarization in La and Mg co-substituted BiFeO<sub>3</sub> thin film during the fatigue process, *Applied Physics Letters*, 100, 042902, 2012.
5. A.Kumar, T.S.Herng, K.Y.Zeng, J.Ding, Bipolar charge storage characteristics in copper and cobalt co-doped zinc oxide (ZnO) thin film, *ACS Applied Materials & Interfaces*, 4, 5276-5280, 2012.
6. T.S.Herng, A. Kumar, C.S.Ong, Y.P.Feng, Y.H.Lu, K.Y.Zeng, J.Ding, Investigation of the non-volatile resistance change in noncentrosymmetric compounds, *Scientific Reports*, 2, 587, 2012.
7. J.Zhu, K.Y.Zeng, L.Lu, Cycling effects on surface morphology, nanomechanical and interfacial reliability of LiMn<sub>2</sub>O<sub>4</sub> cathode in thin film lithium ion batteries, *Electrichimica Acta*, 68, 52-59, 2012.
8. T.Li, K.Y.Zeng, Piezoelectric properties and surface potential of green abalone shell studied by scanning probe microscopy techniques, *Acta Materialia*, 59, 3667-3679, 2011.
9. T.S.Herng, M.F.Wong, D.C.Qi, J.B.yi, A.Kumar, A.Huang, F.C.Kartawidjaja, S.Smasici, P.Abbamonte, C.Sánchez-Hanke, S.Shannigrahi, J.M.Xue, J.Wang, Y.P.Feng, A.Rusygi, K.Y.Zeng, J.Ding, Mutual ferromagnetic-ferroelectric coupling in multiferroics copper-doped ZnO, *Advanced Materials*, 23, 1635-1640, 2011.
10. M.F.Wong, T.S.Herng, Z.K.Zhang, K.Y.Zeng, J.Ding, Stable bipolar surface potential behavior of copper-doped zinc oxide films studied by Kelvin probe force microscopy, *Applied Physics Letters*, 97, 232103, 2010.

### Book Chapters:

1. J.Zhu and K.Y.Zeng, Studying the localized electrochemical phenomena in rechargeable Li-ion batteries by scanning probe microscopy techniques, in *Nanotechnology for Sustainable Energy*, ACS Symposium Series, Vol 1140, American Chemical Society, 2013.

2. K.Y.Zeng, K.B.Yeap, A.Kumar, L.Chen, H.Y.Jiang, Fracture toughness and interfacial adhesion strength of thin films: Indentation and scratch experiments and analysis, in *Handbook of Nanostructured Thin Films and Coatings – Mechanical Properties*, CRC Press, 2010.
3. K.Y.Zeng, Nanoindentation and indentation creep of polymeric materials, in *Polymer Tribology*, Imperial College Press, 2009.
4. K.Y.Zeng, Nanoindentation of thin films and its application, in *Handbook of Nanoceramics and their based Nanodevices, Vol.3 – Characterization and Properties*, American Scientific Publishers, 2009.
5. K.Y.Zeng, Nanoindentation: Recent development and applications, in *Handbook of Theoretical and Computational Nanotechnology, Vol.4 – Nanomechanics and Multiscale Modeling*, American Scientific Publishers, 2006.