Hakkwan Kim

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OBJECTIVES

To elucidate the relationship among the surface, interface and crystal defects such as vacancy, dislocation and triple junction, especially in thin films and nanoscale materials using characterization tools such as HRTEM, EFTEM with EELS, STEM, FIB, SEM, AFM and STM is my specialty. Various work experience is also my strong point to utilize the creativity and knowledge for materials engineering related industries.

EDUCATION

8/2004 – **Purdue University, West Lafayette, Indiana**

Ph. D Candidate in *Materials Engineering*

3/1997 – 2/1999 **Hanyang University, Seoul, Republic of Korea**

M.S. in *Materials Science and Engineering*

Thesis: *A Study on the Phase Transformation and Oxidation Behavior of Plasma-sprayed Thermal Barrier Coating*

3/1992 – 2/1997 **Hanyang University, Seoul, Republic of Korea**

B.S. in *Materials Science and Engineering*

CAREER EXPERIENCE

8/2004 – Purdue University, West Lafayette, Indiana

Research Assistant, School of Materials Engineering

1/2006 – 12/2006 Purdue University, West Lafayette, Indiana

Teaching Assistant, *MSE581 Scanning Electron Microscopy Skills*

1/2005 – 5/2005 Purdue University, West Lafayette, Indiana

Teaching Assistant, *MSE367 Materials Processing Laboratory*

3/2004 – 6/2004 Daelim College, Anyang, Republic of Korea

Part-time Lecturer, *Introduction to the Advanced Materials*

1/2004 – 6/2004 Neobiotech Corporation, Seoul, Republic of Korea

Senior Researcher in Dental Material Research Center

4/1999 – 12/2003 Woori Dong Myung Corporation, Seoul, Republic of Korea

Researcher in Dental Material Research Center

3/1997 – 2/1999 Hanyang University, Seoul, Republic of Korea

Research Assistant in *Materials Science and Engineering*

TECHNICAL SKILLS

A. Device Fabrication

Thin Film Deposition: Physical Vapor Deposition (Sputter, Evaporator, Pulsed Laser Deposition) with *in-situ* heating, Atomic Layer Deposition (ALD), Metal contact and sample preparation for TEM: Focused Ion Beam (FIB)

B. Materials Characterization

300kV FE-TEM (FEI Titan 80/300) and nanoscale Gatan energy filtered elements mapping with attached EELS, 200kV TEM with EDS (JEOL 2000FX), FIB (FEI Nova 200), FE-SEM (Hitachi-S4800), AFM (Veeco MultiMode), Area Detector (Bruker AXS)

HONORS AND AWARDS

8/2004 – Member of Alpha Sigma Mu Honor Society

8/2004 – 7/2005 The Chancellor's List

12/2001 The 1st Achievement Award from the President of Woori Dong Myung Corporation

3/1992 – 2/1999 Numbers of scholarship during undergraduate and graduate courses

SELECTED COURSES

Deposition Processing of Thin Films and Coatings, TEM & Crystalline Imperfections, Fracture of Materials, Introduction to Atomic Force Microscopy, Solid State Devices, Polymer Synthesis, Quantitative Analysis of Microstructure, Transport Phenomena in Solids, Phase Transformation in Solids, Properties of Solids, Transmission Electron Microscopy Skills, Scanning Electron Microscopy Skills

PROJECTS

8/2004 – "*Conducting triple junction lines in columnar thin films*", supported by the National Science Foundation, Division of Materials Research, under grant number 0504813

3/2002 – 7/2003 "*A study on the effects of process parameters on the bioceramic coating properties*", supported by Woori Dong Myung Corporation

7/2001 – 6/2002 "*A study on the mechanical properties and color improvement of porcelain fused to metal (PFM)*", supported by Woori Dong Myung Corporation (APEX series)

3/2000 – 7/2001 "*New surface modification method of implant for biomaterials*", supported by Woori Dong Myung Corporation (SLA type NeoPlant)

3/1998 – 2/2000 "*The effect of phase transformation and microstructure of ZrO_2-CeO_2 coating on the thermal insulation lifetime under high temperature thermal cycle*", supported by Korea Science and Engineering Foundation (KOSEF)

11/1997 – 8/1998 "*A study on the properties of corrosion resistance thermal spray coating*", supported by Research Institute of Industrial Science and Technology (RIST)

8/1997 – 8/1998 "*A study on the lifetime and thermal insulation properties of ZrO_2-CeO_2-Y_2O_3 coating under high temperature thermal cycle*", supported by Korea Electric Power Corporation (KEPCO)

4/1997 – 3/1998 "*The Relationship between the Life - time & the Structure Properties of CeO_2 Stabilized Zirconia TBCs*", supported by Hanyang University (HYU)

7/1996 – 6/1997 "*A study on the wear mechanism of NiCrSiB/WC-12%Co mixed plasma spray coating layer*", supported by Ministry of Education (MOE)

ACADEMIC PRESENTATION & CONFERENCES

1. Shashank Shekhar, **Hakkwan Kim**, Raghavan Narayanan and Alexander H. King: "Triple junction property assessments", 12th International conference on intergranular and interphase boundaries, July 10-13, 2007, Barcelona, Spain.
2. **Hakkwan Kim** and Alexander H. King: "Nanoscale patterning by diffusion of Mn through triple junctions in LiF thin films", 2007 the First Annual Birck Nanotechnology Center Research Review, April 2, 2007, West Lafayette, Indiana, USA.
3. **Hakkwan Kim** and Alexander H. King: "Diffusion of Mn into grain boundaries and triple junctions in LiF thin films", 2007 TMS 136th Annual Meeting & Exhibition – Diffusion in Advanced Materials and Processing, February 25 – March 1, 2007, Orlando, Florida, USA.
4. **Hakkwan Kim** and Alexander H. King: "Texture evolution of lithium fluoride thin films by nucleation", 2006 MRS Fall Meeting, November 27-December 1, 2006, Boston, Massachusetts, USA.
5. **Hakkwan Kim** and Alexander H. King: "Grain growth and texture development in lithium fluoride thin films", 2006 Gordon Research Conference – Physical Metallurgy, July 23-28, 2006, Holderness School, Plymouth, New Hampshire, USA.
6. **Hakkwan Kim**, Ju-Woong Jang and Deuk-Yong Lee: "Osteoblast-like cell morphology, proliferation and differentiation for various implant materials", 3rd International Symposium on Designing, Processing and Properties of Advanced Engineering Materials (ISAEM-2003), November 5-8, 2003, Hyatt Regency Jeju Jungmun, Jeju Island, Korea.
7. Ju-Woong Jang, Byoung-Soo Kim, **Hakkwan Kim** and Deuk-Yong Lee: "Correlation between thermal expansion coefficients of La_2O_3-Al_2O_3-SiO_2 glasses and strength of the glass infiltrated alumina for all ceramic crown", 3rd International Symposium on Designing, Processing and Properties of Advanced Engineering Materials (ISAEM-2003), November 5-8, 2003, Hyatt Regency Jeju Jungmun, Jeju Island, Korea.
8. **Hakkwan Kim**, Ju-Woong Jang, Hee-Seok Chung, Deuk-Yong Lee: "Osteoblast cell morphology, proliferation, and differentiation in variation with biomaterials", 2003 Annual Autumn Conference of the Korean Ceramic Society, October 17-18, 2003, Paichai University, Daejeon, Korea.
9. **Hakkwan Kim**, Ju-Woong Jang, Deuk-Yong Lee and Ji-Woong Moon: "Effects of TiO_2 plasma spray

coating and thermal oxidation on the biocompatibility of Ti and Ti-6Al-4V", 2003 Annual Spring Conference of the Korean Ceramic Society, April 18-19, 2003, Kyonggi University, Suwon, Korea.

10. Ju-Woong Jang, Byoung-Soo Kim, Deuk-Yong Lee and **Hakkwan Kim**: "Effects on the glass composition in alumina-glass composite", 2002 Annual Autumn Conference of the Korean Ceramic Society, October 18-19, 2002, Sunchun National University, Sunchun, Korea.
11. Ju-Woong Jang, Dae-Hee Hong, Byoung-Soo Kim, Deuk-Yong Lee, **Hakkwan Kim** and Ham-Duck Sun: "Low temperature phase stability of Y_2O_3-Nb_2O_5-ZrO_2 ceramic system", 2001 Annual Autumn Conference of the Korean Ceramic Society, October 10-20, 2001, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea.
12. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: "Thermal properties of CeO_2 and Y_2O_3 stabilized zirconia thermal barrier", 80th American Welding Society (AWS) annual meeting, April 12-15, 1999, St. louis, Missouri, USA.
13. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: "Failure analysis of plasma sprayed ZrO_2-CeO_2-Y_2O_3 thermal barrier coatings", United Thermal Spray Conference (UTSC), March 17-19, 1999, Düsseldorf, Germany.
14. **Hakkwan Kim,** Han-Shin Choi and Chang-Hee Lee: "Thermal & Mechanical Properties of CeO_2 Stabilized Zirconia Thermal Barrier Coating", 8th Thermal Spray Technology Workshop, November 20, 1998, Hanyang University, Seoul, Korea.
15. **Hakkwan Kim**, Han-Shin Choi and Chang-Hee Lee: "Degradation of Ceria and Yttria Partially Stabilized Zirconia Thermal Barrier Coatings", 5th Asian Surface Finishing Forum, October 27-30, 1998, Olympic Parktel, Seoul, Korea.
16. **Hakkwan Kim,** Han-Shin Choi and Chang-Hee Lee: "Thermal & Mechanical Properties of CeO_2 Stabilized Zirconia Thermal Barrier Coating", 1998 Annual Fall Conference of the Korean Institute of Metals and Materials, October 23-24, 1998, Seoul National University, Seoul, Korea.
17. **Hakkwan Kim**, Han-Shin Choi and Chang-Hee Lee: "The Relationship between the Life - time & the Structure Properties of ZrO_2-CeO_2-Y_2O_3 TBCs", 7th Thermal Spray Technology Workshop, June 12, 1998, Korea Institute of Machinery and Materials (KIMM), Changwon, Korea.
18. **Hakkwan Kim** and Chang-Hee Lee: "The Relationship between the Life - time & the Structure Properties of ZrO_2-CeO_2-Y_2O_3 TBCs", 1998 Annual Spring Conference of the Korean Institute of Metals and Materials, April 25, 1998, Pusan University, Pusan, Korea.

CONFERENCE PROCEEDINGS

1. **Hakkwan Kim** and Alexander H. King: Texture evolution of lithium fluoride thin films by nucleation, in *Thermodynamics and Kinetics of Phase Transformations in Inorganic Materials*, edited by C. Ambromeit, P. Bellon, J-L. Bocquet, D.N. Seidman (Mater. Res. Soc. Symp. Proc. 979E, Warrendale, PA, 2007), 0979-HH11-19.

2. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: “Thermal properties of CeO_2 and Y_2O_3 stabilized zirconia thermal barrier", Proc. of 80th AWS annual meeting, p.68-69, (1999).
3. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: "Failure analysis of plasma sprayed ZrO_2-CeO_2-Y_2O_3 thermal barrier coatings", United Thermal Spray Conference, proceeding - No. 4, 740-746 (1999), Düsseldorf, Germany.
4. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: "Properties and Phase Transformation of CeO_2 and Y_2O_3 stabilized zirconia plasma thermal barrier coatings", Proc. of the 3rd International NanoCeramic Forum and 2nd International symposium on intermaterials, CPRC ceramic, Hanyang University, p.300-308, CPRC, ISIR(research center for intermaterials, Osaka Univ.) PML(Max Planck Institute, Germany).
5. **Hakkwan Kim**, Han-Shin Choi, Chang-Hee Lee: "Degradation of Ceria and Yttria Partially Stabilized Zirconia Thermal Barrier Coatings", Asian Finish 98', p.124-125, (1998), Seoul, Korea.

JOURNAL PAPERS – in Korean

1. **Hakkwan Kim**, Ju-Woong Jang, Hee-Seok Chung, Deuk-Yong Lee: "Osteoblast cell morphology, proliferation, and differentiation in variation with biomaterials", Journal of the Korean Ceramic Society, Vol.40, No.6 (2003) 601-607.
2. Byoung-Soo Kim, Deuk-Yong Lee, **Hakkwan Kim** and Ju-Woong Jang: “The Decision on the Thermal Expansion Coefficient of the Glass infiltrated in All Ceramic Crown”, Journal of the Korean Ceramic Society, Vol.40, No.1 (2003) 93-97.
3. Ju-Woong Jang, **Hakkwan Kim**, Deuk-Yong Lee, Dae-Joon Kim and Sun-Min Park: “The effect of trivalent cation doping on the low temperature phase stability of 2Y-TZP", Journal of the Korean Ceramic Society, Vol.39, No.11 (2002) 1055-1062.
4. Ju-Woong Jang, **Hakkwan Kim**, Deuk-Yong Lee, Dae-Joon Kim and Sun-Min Park: "Influence of Nb_2O_5 on the phase stability at low temperature and mechanical properties of Y-PSZ", Journal of the Korean Crystal Growth and Crystal Technology, Vol.12, No.5 (2002) 259-266.
5. Sang-Hyeok Lee, Duck-Sun Ham, **Hakkwan Kim**, Ju-Woong Jang and Myung-Ho Kim: “The effect of burn-out temperature and cooling rate on the microstructure and corrosion behavior of dental casting gold alloy”, Journal of Korean Academy of Dental Technology, Vol. 22, No.1, 73-82 (2000).
6. **Hakkwan Kim**, Han-Shin Choi and Chang-Hee Lee: “The Relationship between the Life - time & the Structure Properties of CeO_2 Stabilized Zirconia TBCs”, J. Kor. Inst. Met. & Mater., Vol.37 No.1 (1999) 1844-1853.
7. **Hakkwan Kim**, Han-Shin Choi and Chang-Hee Lee: “The Relationship between the Life - time & the Structure Properties of ZrO_2-CeO_2-Y_2O_3 TBCs - Part 1 . Comparison to ZrO_2-Y_2O_3”, J. Kor. Inst. Met. & Mater., Vol.36 No.9 (1998) 1439-1448.

8. Hee-Seok Ahn, **Hakkwan Kim** and Chang-Hee Lee: “The characteristics and application of the plasma spray coating“, Journal of Korean Welding Society, Vol.15 No.5 (1997) 1-10.

JOURNAL PAPERS – in English

1. **Hakkwan Kim** and Alexander H. King: “Control of porosity in fluoride thin films prepared by vapor deposition”, Journal of Materials Research, (2007, in press).
2. Ju-Woong Jang, **Hakkwan Kim** and Deuk-Yong Lee: "The effect of tetravalent dopants on the unit cell volume of 2Y-TZP and 8Y-SZ", Materials Letters, Vol.58, No.7-8 (2004) 1160-1163.
3. **Hakkwan Kim**, Ju-Woong Jang and Chang-Hee Lee: "Surface modification of implant materials and its effect on attachment and proliferation of bone cells", Journal of Materials Science: Materials in Medicine, Vol.15, No.7 (2004) 825-830.
4. **Hakkwan Kim** and Ju-Woong Jang: "Electrochemical corrosion behavior and MG-63 osteoblast-like cell response of surface-treated titanium", Metals and Materials International, Vol.10, No.5 (2004) 439-446.
5. Ju-Woong Jang, Byoung-Soo Kim, **Hakkwan Kim** and Deuk-Yong Lee: "Correlation between thermal expansion coefficients of La_2O_3-Al_2O_3-SiO_2 glasses and strength of the glass infiltrated alumina for all ceramic crown", Materials Science Forum, Vol.449, No.4 (2004) 1193-1196.
6. Deuk-Yong Lee, Se-Jong Lee, Ju-Woong Jang, **Hakkwan Kim** and Dae-Joon Kim: "Biotribological properties of TZP/Al_2O_3 ceramics for biomechanical applications", Journal of the Korean Ceramic Society, Vol.40, No.6 (2003) 525-529.
7. **Hakkwan Kim**, Ju-Woong Jang, Byoung-Soo Kim, Ji-Woong Moon, Deuk-Yong Lee and Chang-Hee Lee: "Effects of process parameters on the coating properties of APS TiO_2 bioceramic coatings", Journal of the Korean Ceramic Society, Vol.40, No.2 (2003) 123-127.
8. Chang-Hee Lee, **Hakkwan Kim**, Han-Shin Choi and Hee-Seok Ahn: “Phase Transformation and Bond Coat Oxidation Behavior of Plasma-sprayed Zirconia Thermal Barrier Coating", Surface and Coatings Technology 124, 1-12 (2000).

REFERENCES

1. **Alexander H. King**, Professor and Head of School of Materials Engineering, Purdue University, West Lafayette, IN 47907-2036

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2. **Changhee Lee**, Professor of Division of Materials Science and Engineering, Hanyang University, Seoul, Republic of Korea. 133-791

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