

Minwoong Kang

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EDUCATION

University of Illinois at Urbana-Champaign, IL

Doctor of Philosophy in Mechanical Engineering (GPA: 4.0/4.0)

May 2017 - Present

Research topic: Alternative thermodynamic cycles and optimization of heat exchanger for not-in-kind cooling technologies

Yonsei University, South Korea

MS in Mechanical Engineering

March 2008 - February 2010

Thesis: Reactivity and kinetics of coal char gasification with CO₂ and steam

Bachelor of Science in Mechanical Engineering

March 2004 - February 2008

EMPLOYMENT EXPERIENCE

Hanon Systems, Novi, Michigan / USA

May 2021 - August 2021

Intern, Advanced Team

- GT-suite 1D model for vapor injection system (AC/HP)

Hanon Systems, Daejeon / Korea

January 2010 - October 2015

Junior Engineer, SUV&RV HVAC System Team

(Formerly Halla Visteon Climate Control)

- Design & development of HVAC, A/C pipe & radiator for automobile
- Test & data analysis of A/C system in bench & vehicle level
- Project management for Hyundai Motors' mass production
 - Carens, Tucson / Sportage (Europe, China), Soul EV, Tucson Fuel Cell vehicle etc.

RESEARCH EXPERIENCE

University of Illinois at Urbana-Champaign, IL

May 2017 - Present

Graduate research assistant, Air Conditioning and Refrigeration Center (ACRC)

- Alternative thermodynamic cycles for cooling and heating
 - Comparison among various thermodynamic cycles including not-in-kind cooling technologies
- Optimized heat exchanger designs for not-in-kind cooling technologies
 - Transient system modeling for solid-state caloric cooling (MATLAB)
 - Experimental investigation to optimize heat exchanger design in solid-state caloric cycles

Yonsei University, South Korea

Post-master, Nano Energy/Environment System Lab

December 2016 - May 2017

- Development of AQCS solution for PM10 emission control for Korean standard and new standard coal-fired power plants (funded by Doosan Heavy Industries & Construction)

Graduate Research Assistant, Nano Energy/Environment System Lab

March 2008 - December 2009

- Study of reactivity and kinetics of coal char for Integrated Gasification Combined Cycle (IGCC) (funded by Doosan Heavy Industries & Construction)
 - CFD modeling (Ansys Fluent) for one-stage entrained flow coal gasifier
 - Experimental analysis to study reactivity and kinetics of coal char with O₂ and CO₂

Undergraduate Research Intern, Nano Energy/Environment System Lab

March 2007 - February 2008

- Size distributions of total airborne particles of pyrolysis of refuse plastic fuel (RPF) using virtual impactor

CORE TECHNICAL SKILLS

Computer Skills – GT-suite, MATLAB, Ansys Fluent, LabVIEW, Engineering Equation Solver (EES), Python
3D CAD program - CATIA, SOLIDWORKS, Creo

AWARDS & SCHOLARSHIPS

BK21 scholarship by Korean government	Fall 2008 & Spring 2009
Award for excellent grade by Mechanical Engineering Yonsei University	Fall 2007
National scholarship by Korean government	2004 - 2007

ASSISTANTSHIP

Research assistantship	Fall 2017 – Present
Teaching assistantship (Mechanical Design I, Mechanical Design II)	Fall 2018 – Present
Teaching assistantship	Spring, Fall 2008

REFEREED JOURNAL PUBLICATIONS

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3. Seo, D., Lee, S., Kang, M., Hwang, J. & Yu, T. (2010), *Gasification reactivity of biomass chars with CO₂*, Biomass and Bioenergy, 34, 1946-1953
 2. Song, J., Kang, M., Seo, D., LIM, S., PAEK, M., & Hwang, J. (2010.6), *CFD Modeling for 300MW Shell-Type One-Stage Entrained Flow Coal Gasifier: Effect of O₂/Steam/Coal Ratios, Coal Particle Sizes, and Inlet Angles on the Gasifier Performance*, Trans. of the Korean Hydrogen and New Energy Society, 21(3), 227~240
 1. Kang, M., Seo, D., Kim, Y., & Hwang, J. (2010. 3), *Gasification reactivity of Chinese Shinwha Coal Chars with Steam*, The Korean Society of Combustion, 15(1), 22-29

SELECTED CONFERENCE PAPER/POSTER PRESENTATIONS

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8. Kang, M., & Elbel, S., 2021, *Improving performance of solid-state cooling cycles using two-phase zeotropic heat transfer fluids*, 9th IIR International Refrigeration Conference on Caloric Cooling and Applications of Caloric Materials (THERMAG IX), Paper 103.
 7. Kang, M., & Elbel, S., 2021. *Optimization of regenerator design with respect to geometric and operational parameters for solid-state caloric cooling using 1-D transient system model*, 9th IIR International Refrigeration Conference on Caloric Cooling and Applications of Caloric Materials (THERMAG IX), Paper 102.
 6. Kang, M., & Elbel, S., 2021, *Applying Two-phase Zeotropic Heat Transfer Fluids to Solid-state Cooling Cycle and Comparison with Baseline using Single Phase Water*, 18th International Refrigeration and Air Conditioning Conference at Purdue, Paper 210036.
 5. Kang, M., & Elbel, S., 2021, *Comprehensive Study of Heat Transfer and Pressure Drop in Regenerator and Optimization of Solid-state Caloric Cooling Cycles Using Realistic Hydraulic Diameter of Regenerator*, 18th International Refrigeration and Air Conditioning Conference at Purdue, Paper 210035.
 4. Kang, M., & Elbel, S., 2018, *Performance Analysis of Active Magnetic Regenerative Refrigeration Cycle using Transient Modeling*, 17th International Refrigeration and Air Conditioning Conference at Purdue, Paper 2156.
 3. Kang, M., Yoon, K., & Lee, D., 2015.11, *Experimental Study on the Performance Characteristics of Mobile Air- Conditioning System according to IHX*, The Korean Society of Automotive Engineers (KSAE) 2015 Annual Conference and Exhibition, 493 - 497
 2. Song, J., Kang, M., Seo, D., Hwang, J. & Lim, S., 2009.11, *CFD modelling for an one-stage entrained flow coal gasifier: effects of the operating conditions and swirl injection*, 39th The Korean Society of Combustion (KOSCO) SYMPOSIUM, 259-269
 1. Kang, M., Seo, D., Lee, S., Hwang, J. & Lim, S., 2008. 12, *Numerical simulation of gasification in an one stage entrained gasifier*, 37th The Korean Society of Combustion (KOSCO) SYMPOSIUM, 29-35

SELECTED PATENTS (Total 17 Patents)

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8. Hur, H., Kim, J., Lee, D., Kang, M., Maeng, C., & Cho, Y., *Blower of air conditioning system for vehicle*, Korean Patent No. 10-2121549, issued Jun 4, 2020
 7. Kang, M., Kim, J., Lee, D., & Hur, H., *Air conditioner for vehicle*, Korean Patent No. 10-208665, issued May 3, 2020
 6. Kim, J., Kim, Y., Kim, J., Kang, M., Cho, Y., Lee, Y., & Choi, T., *Dual Air Conditioner for Motor Vehicle*, Korean Patent No. 10-1960833, issued May 15, 2019
 5. Kim, H., & Kang, M., *Radiator*, Korean Patent No. 10-181758, filed Jan 5, 2018
 4. Lee, Y., Kim, Y., Kim, J., Kang, M., & Choi, T., *Air conditioner for vehicle*, Korean Patent No. 10-2047734, issued Nov 18, 2019
 3. Kang, M., & Kim, H., *Cooling Module for Motor Vehicle*, Korean Patent No. 10- 1760298, issued Jul 17, 2017
 2. Han, K., Kim, Y., Jung, J., & Kang, M.W., *Coupling structure of evaporator pipe and expansion valve for vehicle*, Korean Patent No. 10-1620223, issued May 3, 2016
 1. Kang, M., Kang, E., & Maeng, C., *A heating apparatus for bus*, Korean Patent Application No. 10-2014-0050855, filed April 28, 2014
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