

Stanford



Tae Wook Kim

Sr Res Scientist-Physical

Energy Resources Engineering

 Curriculum Vitae available Online

CONTACT INFORMATION

- **Alternate Contact**

Tae Wook Kim

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Bio

ACADEMIC APPOINTMENTS

- Sr Res Scientist-Physical, Energy Resources Engineering

ADMINISTRATIVE APPOINTMENTS

- Senior Research Scientist, Dept. of Energy Resources Engineering, Stanford University, (2019- present)
- Physical Science Research Scientist, Dept. of Energy Resources Engineering, Stanford University, (2016-2019)
- Physical Science Research Associate, Dept of Energy Resources Engineering, Stanford University, (2012-2016)
- Postdoctoral Fellow, Lawrence Berkeley National Laboratory, (2010-2012)
- Postdoctoral Scholar, Dept of Energy Resources Engineering, Stanford University, (2009-2010)
- Research Assistant, University of Southern California, (2003-2008)
- Senior researcher and assistant manager, Samchully city gas corporation, (1996-2003)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Society of Petroleum Engineers (2010 - present)
- Member, American Geophysical Union (2010 - present)
- Journal reviewer, Journal of Petroleum Science & Engineering, RSC Advances, Journal of Materials Chemistry A, Chemical Communications, Journal of Nanomaterials (2012 - present)

PROFESSIONAL EDUCATION

- BS, Inha University , Chemical Engineering (1994)
- MS, Inha University , Chemical Engineering (1996)
- Ph.D, University of Southern California , Chemical Engineering (2008)

PATENTS

- Tae Wook Kim, Yur-hwal Yun, Hae-joong Kim. "South Korea Patent 2003-0045957 Method of making a plastic pipe used by a magnetic substance", Samchully gas corporation and Cosmos Corporation, Nov 6, 0178

LINKS

- my profile: https://www.linkedin.com/profile/view?id=31863301&trk=nav_responsive_tab_profile_pic

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Current research in Stanford University

I am conducting the improved/enhanced oil recovery process for conventional and unconventional reservoirs. My main interested topic of my research is to maintain oil supply with proper methods depend on the status of oil reservoirs.

Also, geologic sequestration of carbon dioxide (CO₂) in oil and gas reservoirs is one option to reduce the amount of CO₂ released to the atmosphere. In addition, carbon dioxide injection has been used in enhanced oil recovery (EOR) processes since the 1970s; the traditional approach is to reduce the amount of CO₂ injected per barrel of oil produced. This minimizes the purchase cost of CO₂. For a sequestration process, however, the aim is to maximize both the amount of oil produced and the amount of CO₂ stored.

Finally, my continuous interested topics are the following:

(1) Visualization for In situ 3 phase fluid flow on porous media

The 3 phase fluid flow on porous media such as rock is a critical topic to investigate the transport phenomena including relative permeabilities. The in situ visualization 3 phase with X-ray CT-scanner through a dual energy technique can provide proper information to conduct this topic.

(2) CO₂ separation/sequestration

As a continuing project from my Ph.D research on hydrotalcite (HT) membrane, my aim is to identify the optimal conditions of the synthesis for improving the properties of these membranes and hybrid membranes. Also, I am using LDH (layer double hydroxide) materials to investigate and prepare for the CO₂ adsorption process at an elevated temperature. In particular, my research focus is on the CO₂ removal from flue gases of power-plants. Regarding as CO₂ sequestration in the oil and gas field, the continuous efforts are carried out in the field of enhanced oil recovery (EOR) projects.

(3) Game-changing reverse osmosis membrane for water purification

(4) New conductive membranes for fuel cell system

The continuous efforts for the development of conductive membranes will be accomplished with different inorganic fillers and sulfonated polymers. A candidate for inorganic filler is phosphotungstic acid (PWA) due to its acidity. The cell performance of a fuelcell will test with the selective hybrid conductive membranes at high temperatures around 80 OC.

Publications

PUBLICATIONS

- **Recovery efficiency of a 28 degrees API crude-oil system as a function of voidage replacement ratio** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*

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- Kim, T., Vittoratos, E., Kavscek, A. R.
2019; 175: 1063–87
- **The Effect of Voidage-Displacement Ratio on Critical Gas Saturation** *SPE JOURNAL*
Kim, T., Kavscek, A. R.
2019; 24 (1): 178–99
 - **An Experimental Investigation of Viscous-Oil Recovery Efficiency as a Function of Voidage-Replacement Ratio** *SPE JOURNAL*
Kim, T. W., VITTORATOS, E., Kavscek, A. R.
2016; 21 (4): 1236-1253
 - **Characterization of scalar mixing in dense gaseous jets using X-ray computed tomography** *EXPERIMENTS IN FLUIDS*
Dunmon, J., Sobhani, S., Kim, T. W., Kavscek, A., Ihme, M.
2015; 56 (10)
 - **The Role of Boundary Conditions And Characteristic Length On Imbibition in Both Sandstones And Limestones** *SPE Western North American and Rocky Mountain Joint Meeting*
Kim, T., Kavscek, A.
2014
 - **Brine film thicknesses on mica surfaces under geologic CO₂ sequestration conditions and controlled capillary pressures** *WATER RESOURCES RESEARCH*
Kim, T. W., Tokunaga, T. K., Bargar, J. R., Latimer, M. J., Webb, S. M.
2013; 49 (8): 5071-5076
 - **Capillary pressure and saturation relations for supercritical CO₂ and brine in sand: High-pressure P-c(S-w) controller/meter measurements and capillary scaling predictions** *WATER RESOURCES RESEARCH*
Tokunaga, T. K., Wan, J., Jung, J., Kim, T. W., Kim, Y., Dong, W.
2013; 49 (8): 4566-4579
 - **Wettability Alteration of a Heavy Oil/Brine/Carbonate System with Temperature** *ENERGY & FUELS*
Kim, T. W., Kavscek, A. R.
2013; 27 (6): 2984-2998
 - **Thickness measurements of nanoscale brine films on silica surfaces under geologic CO₂ sequestration conditions using synchrotron X-ray fluorescence** *WATER RESOURCES RESEARCH*
Kim, T. W., Tokunaga, T. K., Shuman, D. B., Sutton, S. R., Newville, M., Lanzirotti, A.
2012; 48
 - **Transport Phenomena in Functional Hydrotalcite Membranes: Carbon Dioxide Selective and Proton Conductive Membranes**
Kim, T.
LAP Lambert Academic Publishing, 2012
 - **Hybrid Hydrotalcite-Sulfonated Poly(ether ether ketone) Cation-Exchange Membranes Prepared by in situ Sulfonation** *INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH*
Kim, T. W., Sahimi, M., Tsotsis, T. T.
2011; 50 (7): 3880-3888
 - **Effect of polystyrene on the morphology and physical properties of silicon carbide nanofibers** *MATERIALS CHEMISTRY AND PHYSICS*
Elyassi, B., Kim, T. W., Sahimi, M., Tsotsis, T. T.
2009; 118 (1): 259-263
 - **INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH** *The Preparation and Characterization of Hydrotalcite Thin Films*
Tae Wook Kim, M. Sahimi, T. T. Tsotsis
2009; 48 (12): 5794
 - **The preparation and characterization of hydrotalcite micromembranes** *CHEMICAL ENGINEERING SCIENCE*
Tae Wook Kim, M. Sahimi, T. T. Tsotsis
2009; 64 (7): 1585
 - **Industrial & Engineering Chemistry Research** *Preparation and Characterization of Hybrid Hydrotalcite-Sulfonated Polyetheretherketone (SPEEK) Cation-Exchange Membranes*

Tae Wook Kim, M. Sahimi, T. T. Tsotsis
2009

- **INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH** *Study of CO₂ diffusion and adsorption on calcined layered double hydroxides: The effect of particle size*
M. Dadwhal, Tae Wook Kim, M. Sahimi, T. T. Tsotsis
2008; 47 (16): 6150
- **Preparation of Hydrotalcite Thin Films Using an Electrophoretic Technique** *INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH*
Tae Wook Kim, M. Sahimi, T. T. Tsotsis
2008; 47 (23): 9127

PRESENTATIONS

- Interpretation Of Spontaneous Imbibitions With Different Boundary Conditions And Characteristic Lengths On Both Sandstones And Limestones. - 2014 SPE Western North America and Rocky Mountain Joint Regional Meeting (4/14/2014 - 4/18/2014)
- In situ visualization on cores with different boundary conditions through X-ray computed tomography scanner (CT-Scanner) during spontaneous imbibition - The AGU Annual Meeting (12/11/2014)
- Thickness of Nanoscale Brine Films on Mineral Surfaces Under Geologic CO₂ Sequestration Conditions Measured with Synchrotron X-ray Fluorescence - The AGU Annual Meeting (12/4/2012)
- Brine Films Thickness on Silica Surfaces Under High Pressure Geologic CO₂ Sequestration Conditions Measured with Synchrotron X-ray Fluorescence - The AGU Annual Meeting (12/6/2011)