

Young-Shin Jun

Meeting climate change head on

Written by BETH MILLER

Jun
전 | 순

Young
영 | 영

Shin
신 | 심

Korean | Chinese

In Korean culture, one's name is selected very carefully, as each has a special meaning. For Young-Shin Jun, PhD, the meaning behind her name — given to her by her grandfather — has formulated the philosophy she uses in life.

“Jun means complete, Young means forever and Shin means trust,” says Jun, associate professor of energy, environmental & chemical engineering in the School of Engineering & Applied Science. Her grandfather chose the name because a woman named Young-Shin was the first congresswoman in Korea. At the time, there were few women in leadership positions in that country, but Jun's grandfather wanted her to be a leader. And she's taken the name and the charge to heart.

“This is a big name for me, because I think that I should be a person who can trust completely forever,” she says. “I think about my name when I make decisions and ask myself if my decision betrays anyone's trust.”

IN THE LAB

Jun has many decisions to make as she has been adding to her roles in the Department of Energy, Environmental & Chemical Engineering since joining the faculty in 2008. Not only does she teach courses, she is principal investigator of the Environmental NanoChemistry Laboratory, where

she studies three main areas, all related to meeting the world's demands for clean water, air and energy: geologic carbon dioxide sequestration, the process of taking carbon dioxide from the atmosphere or flue gases and storing it deep underground to reduce the impact of burning fossil fuels on climate change; the process of how nanoparticles form and transform in natural and engineered aqueous systems; and managed aquifer recharge, a way to recycle stormwater or treated sewage effluent for non-potable and indirect potable reuse.

Maintaining a sustainable energy-water connection is the world's greatest environmental challenge, she says.

“My contribution to meeting this challenge is to advance our understanding of environmental interfacial reactions by providing *in situ*, real-time quantitative information from our unique experimental approaches,” Jun says.

Her lab is using a novel process to determine whether nanoparticle transformation in wastewater treatment will introduce more adverse effects on the quality of the effluent water from wastewater treatment systems, how these nanoparticles can be removed from the system or how they can be further used to better remove toxic contaminants. Already, her work in this area has provided new information on the

“My research can play a critical role in determining how to upscale environmental chemical systems to make a major impact on clean water and energy availability.”

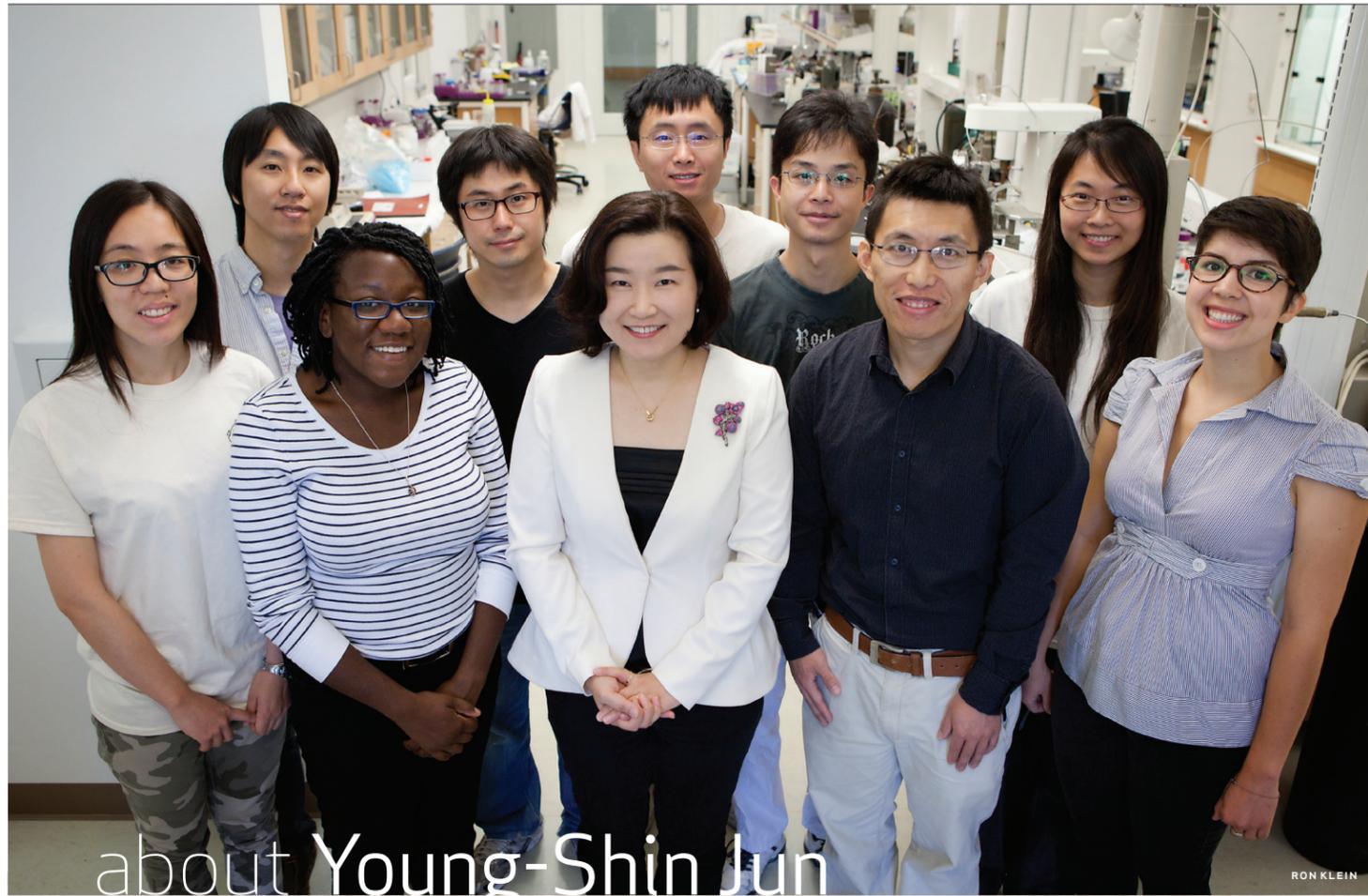
— YOUNG-SHIN JUN, PHD



RON KLEIN



Take a virtual tour of Jun's lab: youtube.com/WUSTLEngineering



about Young-Shin Jun

Jun's lab bridges engineering and science as well as a variety of cultures and languages. Her graduate students come from the United States, Korea and China.

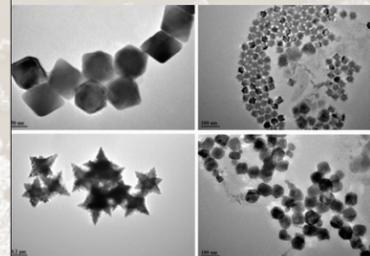
Front row, from left to right: Lijie Zhang, Jessica Ray, Young-Shin Jun, PhD, Xuyang Liu, PhD, Chelsea Neil

Back row, from left to right: Haesung Jung, Doyoon Kim, Yi Yang, PhD, Yujia Min, Qingyun Li



Since Jun spends most of her long workdays thinking about tiny nanoparticles and molecules, when she gets away with her husband, Jihun Ko, she likes to go big. National parks are her favorite places to visit, and she's visited all of them. "While I'm looking at nature, I don't need to think. I can just be there," she says.

Jun's sunny office in Brauer Hall is filled with large potted plants, including a rose bush she bought when she joined the faculty in 2008. She has saved and dried every rose that has blossomed on the plant.



- » More than \$2 million in research funding
- » Number of published articles: 38

» engineering.wustl.edu/faculty/jun

formation of nanoparticles and their reactions in natural and engineered water systems.

"Jun is an excellent colleague and is making contributions both to the scientific community and the department, school and university," says Pratim Biswas, PhD, chair of the Department of Energy, Environmental & Chemical Engineering and the Lucy & Stanley Lopata Professor. "She pursues her research endeavors in environmental nanochemistry with passion."

Jun has added roles in the department outside of research as well. In 2013, she became director of graduate studies for the department, as well as the McDonnell International Scholars Academy Ambassador to Seoul National University in her home city. She is faculty adviser to the university's chapter of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, and she has been recognized nationally with such prestigious awards as the National Science Foundation CAREER Award in 2011 and the Ralph E. Powe Junior Faculty Enhancement Award in 2008. She is currently on the editorial board of *Environmental Science: Processes & Impacts*.

"As the graduate director of the department, Young-Shin diligently directs the doctoral program consisting of more than 95 students," Biswas says. "She is an excellent mentor to her doctoral students, and her drive, discipline and devotion to research is a great motivation to the students. At this early stage in her career, she has placed one of her PhD graduates as a faculty member."

FINDING HER NICHE

Encouraged by her parents to study hard, Jun knew from a very young age that she wanted to take a different path from her father and other family in business: She wanted to be a professor. In Korean high schools, students choose to study either literature or science, and often girls are steered toward literature.

"I said 'no' to literature," she says, emphatically. "I had good scores, and I wanted to go to engineering school. If someone tells me I can't do something, I'm going to do it."

Jun went to Ewha Womans University in Seoul, the world's largest educational institution

exclusively for women and the starting point for many of Korea's female leaders. The timing couldn't have been better — Ewha launched its engineering program, and Jun is one of the first undergraduate students from Ewha's engineering school. She also earned a master's degree at Ewha.

"It was challenging, but challenge gives us opportunities," she says. "I learn more during challenges than when things run smoothly."

As a child, Jun loved to play in a creek near her home, catching fish and playing in the water. Years later, she returned to the creek to find it filled with waste and devoid of fish.

"That motivated me to do something about it," she says. "In my PhD application, I wrote about it and said I wanted the next generation to be able to play in creeks and touch things the way I did."

While a graduate student, Jun took a water chemistry course, and when she read the textbook, it was love at first sight.

"I love water chemistry, but I wanted to expand it because my ultimate and lifetime goal is to develop water chemistry together with nanochemistry and nanotechnology."

"This book, 'Aquatic Chemistry' by Stumm and Morgan, is the bible for an environmental engineer," she says, while gently holding the book she keeps at an arm's reach in her office. "When I read this book, I realized that I really wanted to do aquatic chemistry. That's the reason I went for my PhD."

Jun chose a doctoral program at Harvard University, coincidentally where the late Werner Stumm, PhD, and James J. Morgan, DSc, started their research lab in the 1960s. Her research adviser, Scot Martin, PhD, the Gordon McKay Professor of Environmental Chemistry, wanted to build up the water chemistry area, and Jun was the perfect person to make that happen.

"I really look hard to find a way I can contribute," she says. "The passion and motivation are the strongest justification of why I'm doing this. If you have passion, it helps to keep you moving forward."

