



Rensselaer

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MATERIALS SCIENCE AND ENGINEERING

Graphene van Gogh | ©Michael Deagen



Pawel Koblinski

Professor and
Department Head,
Department of
Materials Science and
Engineering (MSE)

WELCOME

I AM DELIGHTED TO SHARE MY EXCITEMENT WITH YOU ABOUT THE EDUCATIONAL, RESEARCH AND COMMUNITY SERVICE ACTIVITIES THAT ARE ONGOING IN THE DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING AT RENSSELAER.

My enthusiasm is reinforced by the awareness that our success is a collective endeavor involving contributions from faculty, staff, students and alumni. In this issue of *MSE News*, you'll find many highlights of our recent achievements and developments within MSE community at Rensselaer.

Now in my second year leading the department, my appreciation for multiple aspects of the MSE community at Rensselaer has grown. I've thoroughly enjoyed working together to advance excellence and career

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ACADEMICS, GOVERNMENT, AND INDUSTRY RESEARCH – DESAI DOES IT ALL!

Tapan Desai graduated from Rensselaer in 2005 with a Ph.D. in Materials Science and Engineering. His work focused on developing a fundamental understanding of polymer dynamics in nanocomposites using molecular-level computational simulations, under the guidance of Professor Pawel Koblinski. After graduation, he studied ionic liquids at Argonne National Laboratory and nuclear fuel materials at Idaho National Laboratory (INL). For 3 years at INL, he performed simulations based on scalable first principles molecular-dynamics (MD) models to predict how fuel and cladding materials will behave in the core of a nuclear reactor. Later, he joined a defense contractor company, Advanced Cooling Technologies, Inc., in Lancaster, PA as a Research Engineer. Within first 6 months of his joining the company, he received grants on his innovative proposals on “Ablative Materials Development for Heat Shields in Space Vehicles” by NASA SBIR (Small Business Innovative Research) and for Insulation Materials in Rocket Motor Engines by NAVAIR STTR (Small Business Technology Transfer Research). In the following years, he received funding to perform research in different areas such as software development for semiconductors, thermoelectric heat recovery systems, novel low-cost solar collectors for water heaters, hybrid solar coal gasification systems, nanoscale corrosion resistant coatings, nanofuels, pumped two-phase cooling for high energy laser systems, etc. from Army, Navy, Air

Force, DOE, DARPA and NSF. He quickly rose through the ranks to Lead Engineer and then to R&D Manager within 4 years of his joining date. He was responsible for generating external R&D funding of around \$5 million every year. In addition to performing research, he also commercialized several R&D technologies that are currently being incorporated by Advanced Cooling Technologies’ customers.

Tapan joined the Materials Department of Rensselaer after B.S. and M.S. in Chemical Engineering with a desire to learn something new. He had to audit and take a lot of undergraduate courses to prepare for the Ph.D. qualifying examination. He also clearly remembers the help and support received from the other Ph.D. students. These interactions built camaraderie that was helpful throughout his Ph.D. and later, for technical and personal brainstorming. In addition to students, many professors were generous to help by conducting personal mock oral examinations. This creates an open environment between all students and professors, where innovative solutions are sought by understanding the governing fundamentals, deriving hypothesis and then performing simulations and experiments. Tapan believes Rensselaer education promotes its students to be free, innovative thinkers and remove the words “Not Possible” from the dictionary (as long as thermodynamics and kinetics say “Possible”). At Rensselaer,

TAPAN CREDITS HIS INNOVATIVE RESEARCH AND TECHNICAL WRITING SKILL TO HIS RENSSELAER MENTORS

he started publishing his articles in high profile peer-reviewed research journals. He continued publishing in his subsequent positions and now has over 50 publications in different research focused journals such as *Physical Review Letters*, *Applied Physics Letters*, *Scripta Materialia*, and many others. He has received about 1,000 citations for his research articles in renowned journals, including *Nature* and *Science*. He credits the training required for all these publications, which includes performing innovative research and good technical writing skills, to the mentorship received at Rensselaer.

Currently, Tapan is the Director at JLC Electromet (JLC) developing high performance nickel-based alloys for lighting, heating, soft magnetic, automotive, electronics, and welding industries. JLC is one of the world's leading manufacturers of nickel-based alloys in wire and strip forms, from melting stage, with a product line covering hundreds of alloys. He considers himself fortunate as throughout his career he has been associated with varied areas of Materials Science and Engineering such as polymers, nuclear fuel, metals, ceramics, and semiconductors. He has been able to apply his Rensselaer education on a daily basis throughout his professional career. At JLC Electromet, the other Company Directors are also Rensselaer Materials

Alumni, his wife Chitra Baid (B.S. '02 and M.S. '04) and his brother-in-law, Naveen Baid (B.S. '97 and M.E. '98). JLC Electromet is currently exporting to 50+ countries and the next goal for this Rensselaer Materials alumni team is to take JLC Electromet to become one of the top 3 companies in the world for nickel alloys.

What does the future hold for Tapan and his family of business-owners? One can only speculate, but we know that he stands on a solid foundation of skills and knowledge in materials science, gleaned from his training at Rensselaer and beyond. We know that he will continue to do what needs to be done in any given environment!

