Dear Friends and Colleagues,

I am grateful for the opportunity to share our news from the past year, and to introduce DNI as the new A.J. Drexel Nanomaterials Institute.

Established in 2003 as the A.J. Drexel Nanotechnology Institute, DNI was created to coordinate interdisciplinary research, education and outreach, and strategic partnerships in nanotechnology for all of Drexel University. After 10 years of successful collaborations within and beyond the University, we have changed our name to the Nanomaterials Institute to better reflect our strengths and unique capabilities within this important subset of materials (and nanotechnology) research. With materials being at the heart of every major technological advance, this change allows us to emphasize our strengths while maintaining the same wide – in fact, limitless – range of applications for our work, from energy to healthcare and beyond.

As we have come to expect from them, our students filled yet another year with outstanding publications in the field’s leading journals, presentations at the most prestigious conferences, and awards and fellowships from the very best organizations. DNI members published numerous papers in 2013, in an impressive array of journals that included Nanoscale, ChemSusChem, Advanced Energy Materials, Nature Communications, and Science. In June, the American Ceramic Society announced that the 2012 paper “Two-dimensional transition metal carbides,” the paper documenting the discovery of MXenes at Drexel, had been honored with the 2013 ACRS Ross Coffin Purdy Award. This award is given to the author or authors of the paper judged to have been the most valuable contribution to ceramic technical literature during the calendar year. This paper was co-authored by Ph.D. candidates Olha Mashtalir Michael Naguib, B.S. student Joshua Carle, former research professor Volker Presser, Dr. Jun Lu and Prof. Lars Hultman from Linköping University, myself, and Prof. Michel W. Barsoum. The award was presented during the Materials Science and Technology Conference in Montréal in October.

In other competitions, DNI also performed admirably: Kristy Jost won first place in the solid state section, and Kelsey Hatzell first place in the electrochemistry section, of the student poster competition at the Electrochemical Society meeting; Michael Naguib and Babak Anasori received DNI’s 5th Roland Snow (best of show) award in the ACRS Ceramographic Competition in the past 10 years; Babak also won the Materials Today cover competition and will see one of his images on the cover of a 2014 issue of the journal.

We also continued our successes with international education, sending our own students abroad and hosting students from around the world here at Drexel. Drexel was well represented at the graduation of the 8th Materials for Energy Storage and Conversion (MESC) class in Amiens, France, which included four students who did their MSc thesis research at Drexel: Christopher Sole, Muhammad Boota, Ivan Garcia Torregrosa, and Immanuel Mayrhuber. The students worked with five different Drexel faculty throughout their time here: myself, Michel Barsoum, Caglar Kurumcu, Vibha Kalra, and Jason Baxter. In September they returned to Amiens to defend their theses. All four students successfully defended. Ivan was awarded the prize for best presentation, and placed third in the MESC-B class. Christopher placed first in class. We congratulate the MESC-B students on their graduation and look forward to hosting future MESC students at Drexel.

Continuing in our efforts to serve our industrial community, DNI again collaborated with partners at the Lehigh Nanotechnology Network to host a regional 2013 Nanotechnology for Energy conference here at Drexel in May. Local representatives from industry and academia were in attendance and shared ideas and experiences of setting standards in the field. The 2014 conference will be held at Lehigh, and we look forward to another successful year of collaboration on this front.

These updates and awards are merely a snapshot of our successes during the year 2013. I encourage you to explore more of our news and highlights online at www.nano.drexel.edu and stay in touch – we have a number of exciting developments to come.

Wishing you a year of accomplishments, successes, and collaboration.

Yours,

Yury Gogotsi, Ph.D., D.Sc.
Distinguished University Professor and Trustee Chair of Materials Science & Engineering and Chemistry
Director of the A.J. Drexel Nanomaterials Institute

January
- Colorized SEM image of nano-anatase (TiO2) crystals decorating amorphous graphene-like carbon, fabricated by oxidizing two-dimensional TiC2 powder. The resulting nano-TiO2/carbon sheets hybrid structure showed good performance as an anode material in lithium ion batteries. 2013 Roland B. Snow Award Winner. Synthesis: M. Naguib; SEM and Coloring: B. Anasori

February
- Surface of a cotton fiber. SEM: B. Anasori; M. Beidaghi; Coloring: K. Jost

March
- Spherical manganese dioxide– designed for the flowable electrodes in the Electrochemical Flow Capacitor. Synthesis: L. Fan; SEM: M. Beidaghi; Coloring: K. Hatzell

April
- TiO2 after clorination at 300°C. Synthesis: O. Mashtalir; SEM: M.R. Lukatskaya; Coloring: K. Van Aken

May
- Carbon welded cotton yarn spun with stainless steel. SEM: B. Anasori; M. Beidaghi; Coloring: K. Jost

June
- Nb2O5 MXene after oxidation treatment. Synthesis: C.J. Zhang; SEM and Coloring: M.R. Lukatskaya

July
- Carbon welded cotton yarn spun with stainless steel. SEM: B. Anasori; M. Beidaghi; Coloring: K. Jost

August
- WO3 film on brass. Synthesis: O. Mashtalir; SEM: M. Kurtoglu; Coloring: K. Van Aken

September
- SEM of layered MXene. Synthesis: C.E. Ren; SEM: M.R. Lukatskaya; Coloring: Y. Dall’Agnese

October
- Colorized SEM image shows Nb2O5 layers coated on graphene aerogel. The graphene/Nb2O5 structure was formed in a one-step hydrothermal process. This freestanding and mechanically robust composite is used as a three-dimensional (3D) supercapacitor electrode, taking advantage of high conductivity of the graphene aerogel network and pseudocapacitive behavior of Nb2O5, which leads to a high energy density. Synthesis: M. Beidaghi; SEM and Coloring: B. Anasori

November
- SEM of fibers produced by electrospinning. Synthesis: Z. Ling; C.E. Ren; SEM: M. Beidaghi; Coloring: Y. Dall’Agnese

December
- Colorized SEM image shows Nb2O5 layers coated on graphene aerogel. The graphene/Nb2O5 structure was formed in a one-step hydrothermal process. Materials Today 2013 Cover Competition Winner. Synthesis: M. Beidaghi; SEM and Coloring: B. Anasori