

## Introduction to the CMCM and Carbon Materials for the Future

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I appreciate the opportunity to introduce the *Center for Multidimensional Carbon Materials* (CMCM), an Institute of Basic Science (IBS) Center located at the Ulsan National Institute of Science and Technology (UNIST) campus, and thus to briefly discuss the IBS and UNIST as well. I then offer a personal perspective of several types of new carbons and related materials that might be made in the future. These include 'negative curvature carbons', 'diamane' and related ultrathin  $sp^3$ -bonded carbon films/foils,  $sp^2/sp^3$ -hybrid materials, new routes to making diamond, and some others. I will also discuss some of our discoveries related to graphene including in the context of new research at CMCM on carbon and related systems.

Of possible interest:

1. (a) Lu XK, Yu MF, Huang H, and Ruoff RS, *Tailoring graphite with the goal of achieving single sheets*, *Nanotechnology*, **10**, 269-272 (1999). (b) Lu XK, Huang H, Nemchuk N, and Ruoff RS, *Patterning of highly oriented pyrolytic graphite by oxygen plasma etching*, *Applied Physics Letters*, **75**, 193-195 (1999).
2. Zhu, Yanwu; Murali, Shanthi; Stoller, Meryl D.; Ganesh, K. J.; Cai, Weiwei; Ferreira, Paulo J.; Pirkle, Adam; Wallace, Robert M.; Cychosz, Katie A.; Thommes, Matthias; Su, Dong; Stach, Eric A.; Ruoff, Rodney S. *Carbon-Based Supercapacitors Produced by Activation of Graphene*. *Science* **332**, 1537-1541 (2011).
3. Odkhuu, Dorj; Shin, Dongbin; Ruoff, Rodney S.; Park, Noejung; *Conversion of Multilayer Graphene Into Continuous Ultrathin  $sp^3$ -bonded Carbon Films on Metal Surfaces Density*. *Scientific Reports* (2013), DOI: 10.1038/srep03276.
4. Ruoff, Rodney S. *Personal perspectives on graphene: New graphene-related materials on the horizon*. *MRS Bulletin*, **37**, 1314-1318 (2012).

Rodney S. Ruoff, UNIST Distinguished Professor, Department of Chemistry and the School of Materials Science and Engineering, is director of the *Center for Multidimensional Carbon Materials* (CMCM), an IBS Center located at the Ulsan National Institute of Science and Technology (UNIST) campus. Prior to joining UNIST he was the Cockrell Family Regents Endowed Chair Professor at the University of Texas at Austin from September, 2007. He earned his Ph.D. in Chemical Physics from the University of Illinois-Urbana in 1988, and he was a Fulbright Fellow in 1988-89 at the Max Planck Institute für Strömungsforschung in Göttingen, Germany. He was at Northwestern University from January 2000 to August 2007, where he was the John Evans Professor of Nanoengineering and director of NU's *Biologically Inspired Materials Institute*. He has co-authored about 440 peer-reviewed publications related to chemistry, physics, materials science, mechanics, and biomedical science, and is a Fellow of the Materials Research Society, the American Physical Society, and the American Association for the Advancement of Science. He is the recipient of the 2014 Turnbull Prize from the MRS. For further background on some of his research see: [http://en.wikipedia.org/wiki/Rodney\\_S.\\_Ruoff](http://en.wikipedia.org/wiki/Rodney_S._Ruoff) .