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Carbon Materials for the Future

ABSTRACT

I offer a perspective of what new carbon and related materials might be achieved in the future. These include 'negative curvature carbons', 'diamane' and related ultrathin sp^3-bonded carbon films/foils, sp^2/sp^3-hybrid materials, and others. My talk will focus on describing some theoretical calculations that have been reported on such systems, and then I will turn to our efforts at the CMCM to achieve such materials. I will also talk about published work on graphene and perhaps carbon nanotubes.

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).

BIOGRAPHY

Rodney S. Ruoff, Distinguished Professor, UNIST 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 is a Fellow of the Materials Research Society, the American Physical Society, and the American Association for the Advancement of Science and was awarded the 2014 MRS Turnbull Lectureship prize.

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