

This ubiquitous carbon...

Dr. Cristian Contescu
Senior Research Staff, Materials Science and Technology Division
Oak Ridge National Laboratory, Oak Ridge, TN 37831
contescuci@ornl.gov

After Stone Age, Bronze Age, and Iron Age, and after the Silicon Age of the informational revolution, the technologies of 21st century are marked by the ubiquitous presence of various forms of carbon. For a very long time, diamond and graphite were the only known carbon allotropes, but that has changed with the serendipitous discovery of fullerenes, carbon nanotubes, and graphene. Every ten or fifteen years scientists unveil new forms of carbons with new and perplexing properties, while computations suggest that the carbon's family still has members unknown to us today. At a dramatically accelerated pace, new carbon forms find their place at the leading edge of scientific and technological innovations. At the same time traditional forms of carbon are being used in new and exciting applications that make our life safer, healthier, and more enjoyable. The 21st century may soon be recognized as the Age of Carbon forms.

This educational talk will show how carbon, the fourth most abundant element in the Galaxy and the basis of life on Earth, was the engine of most important technological developments throughout the history of civilization. It will emphasize the ability of carbon atoms to generate a variety of mutual combinations and with many other chemical elements. These properties have placed carbon at the core of numerous inventions that define out civilization, while emerging new technologies open a rich path for value-added products in today's market. The potential of new (and traditional) carbon allotropes for development of new applications in nanotechnologies and nanocomposites, energy storage and conversion, gas separation, storage and sequestration, health management and drug delivery, defense and national security, aeronautics and astronautics, basic sciences and life sciences is still not fully explored and demands more basic and applied research. Today's carbon science and technology offers a broad range of opportunities for the young generation of students, engineers and scientists.

Dr. Cristian Contescu is senior staff scientist in the Materials Science and Technology Division at Oak Ridge National Laboratory (ORNL). He earned his M.S. and Ph.D. degrees in physical chemistry at the University of Bucharest and Polytechnic Institute of Bucharest, Romania, respectively. After a 20-year R&D career at the Institute of Physical Chemistry of the Romanian Academy, he joined the Department of Chemical Engineering at Syracuse University as a visiting scientist. He also occupied Senior Scientist positions with HITCO Carbon Composites (Gardena, CA) and Materials Methods LLC (Newport Beach, CA). His activities at ORNL involve basic and applied research on surface reactivity of carbon materials, from gas adsorption on porous carbons, chemical reactivity and oxidation stability of nuclear graphite to gas storage and separation and electrochemical energy storage in batteries and capacitors. He is co-author of over 85 papers and chapters of books, 8 patents, co-editor of *Dekker Encyclopedia of Nanoscience and Technology*, and team member recipient of R&D 100 Award (2013) and of Federal Laboratories Consortium Award of Excellence in Technology Transfer (2014). Dr. Contescu is currently Editorial Advisory Board member of the CARBON journal and Advisory Committee member of the American Carbon Society.