and sources of fatigue in reinforcement cables for bridges (deep penetration).

One of Carpenter's major contributions to materials science is the invention of the high intensity pulsed thermal neutron source. He recognized the value of using the intrinsic time structure of a pulsed spallation neutron source to perform neutron scattering. He also recognized that with clever design of the spallation target and its moderator and reflector assemblies, the efficiency in converting proton beam power to neutron production while maintaining very sharp neutron pulses (for high-resolution neutron scattering) could be vastly increased.

Carpenter's pioneering work in inventing the pulsed thermal neutron source (ZING-P at ANL) and a myriad of instrumentation designed for such a source resulted in the construction of a new generation of neutron sources. These sources in Japan (KENS), Argonne (the Intense Pulsed Neutron Source, of which Carpenter was the director), the Los Alamos Neutron Science Center, and ISIS in the United Kingdom established a new trend in source performance. Today, the Spallation Neutron Source at Oak Ridge, J-PARC (Japan), the European Spallation Source (to start in 2019)—all pulsed spallation neutron sources—have exceeded the performance of the most powerful reactors.

Carpenter earned his PhD degree in nuclear engineering from the University of Michigan. He is a Fellow of the American Physical Society, American Nuclear Society, Neutron Scattering Society of America (which also awarded Carpenter its highest honor—the Cliff Shull Prize), and the American Association for the Advancement of Science. He continues to lecture and is actively involved in commissioning the ultra-small-angle-scattering instrument at the Spallation Neutron Source.

Seth R. Marder to receive Mid-Career Researcher Award for chemical structure–property characterization of organic molecules

The Materials Research Society (MRS) has named Seth R. Marder, professor and Georgia Power Chair in the School of Chemistry and Biochemistry and the School of Materials Science and Engineering at the Georgia Institute of Technology, to receive the Mid-Career Researcher Award "for establishing fundamental relationships between the chemical structure of organic molecules and their optical and electronic properties, thereby profoundly impacting how the scientific community designs optimized molecular structures for use in nonlinear optical applications." Marder will be recognized during the Award Ceremony at the 2015 MRS Spring Meeting in San Francisco. The Mid-Career Researcher Award, endowed by Aldrich Materials Science, recognizes exceptional achievements in materials research made by mid-career researchers.

Marder's work on the nonlinear polarizabilities and nonlinear absorptive properties of organic materials has had a profound effect on how the chemistry and physics communities think about the molecular basis for nonlinear optical responses, and also on how chemists go about designing optimized structures for nonlinear optical applications.

Prior to Marder's work, the search for nonlinear optical chromophores was largely empirical and guided by simplistic concepts, for example, π-systems need to be substituted with strong donors and acceptors for second-order responses, and long conjugated π-systems are needed for third-order responses. Marder pioneered the use of organometallic compounds for nonlinear optical applications. Later, he applied physical organic methodologies to gain an understanding of how to optimize molecular structures for achieving large second-order nonlinear optical responses. He realized that within a simple valence bond approach, it could be useful to map the dependencies of nonlinear polarizabilities as a function of ground-state polarization. Marder refined and expanded these concepts and championed the use of bond length alternation in polymethine dyes as a useful metric to correlate the degree of charge separation in its ground state with its linear and nonlinear polarizabilities.

Marder received his PhD degree in chemistry from the University of Wisconsin–Madison. He has 23 issued patents, of which 11 are licensed and 9 were jointly developed with companies. He has published over 375 peer-reviewed papers. Other honors include the Materials Awards from the Georgia Tech Research Corporation for Excellence in Research, American Chemical Society Arthur C. Cope Scholar, and the Outstanding Award in Research Program Development from Georgia Tech. Marder is a Fellow of the American Association for the Advancement of Science, the Optical Society of America, Society of Photo-Optical Instrumentation Engineers, the Royal Society of Chemistry, and the American Physical Society.

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