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Gregory Beaucage (1958–2025)

Dale W. Schaefer,[a] Peter A. Beaucage[b,c] and Jan Ilavsky[d]*

[a]University of Cincinnati, Cincinnati, Ohio, USA, [b]Lila Sciences, Cambridge, MA, USA, [c]NIST, Gaithersburg, MD, USA, and [d]Argonne National Laboratory, Lemont, IL, USA. *Correspondence e-mail: ilavsky@anl.gov

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Professor Gregory Beaucage of the University of Cincinnati passed away unexpectedly in July 2025 at the age of 67. His loss is felt deeply across the science fields he touched, especially by those of us who knew him as a dear friend.

Greg earned his BSc degrees in Zoology and Chemical Engineering from the University of Rhode Island (1980–1982) and completed his PhD in Polymer Science and Engineering at the University of Massachusetts, Amherst (1991), where his dissertation on isotactic-PVME/PS blends laid the groundwork for a career that linked fundamental polymer physics with practical applications. After a productive post-doctoral position at Sandia National Laboratories, in 1994 he joined the faculty at the University of Cincinnati, where he served in the Department of Materials Science and Engineering and the Department of Chemical and Environmental Engineering.

Readers of this journal will associate Greg with the 'unified scattering function (USF)' (aka 'unified fit'), a versatile analytical framework that unifies Guinier, power-law and fractal scattering regimes into a single fit for small-angle X-ray, neutron and light scattering data. Hated or loved, understood or misused, USF became the standard tool for characterizing hierarchical materials ranging from polymer solutions and gels to nanocomposites, biological macromolecules, soot particles, precipitates in metals – and practically everything else small-angle scattering touches. The large number of citations to USF papers and the fact that USF is implemented in the common SAS data analysis tools like *SasView*, *Irena* and *GSAS-II* show the impact of this method. Thousands of researchers worldwide use the USF in classrooms, laboratories, industrial process monitoring and fundamental research.

Greg's most cited papers related to USF are:

Structural studies of complex systems using small-angle scattering: a unified Guinier/power-law approach (Beaucage & Schaefer, 1994).

Approximations leading to a unified exponential/power-law approach to small-angle scattering (Beaucage, 1995).

Small-angle scattering from polymeric mass fractals of arbitrary mass-fractal dimension (Beaucage, 1996).

Particle size distributions from small-angle scattering using global scattering functions (Beaucage *et al.*, 2004).

Over 10000 citations and an h-index $\simeq 44$ attest to the breadth and depth of his contributions. His work produced new understanding of polymer chain topology (*e.g.* long-chain branching in polyethylene), glass-transition behavior in thin films, and equilibrium aggregation in surfactant and pigment systems. His work on *in situ* nanoparticle growth in flames, soot formation in diesel engines and the thermo-reversible aggregation of inks bridged soft-matter physics, materials engineering and environmental science.

Greg was also a lifelong teacher and mentor. He taught core polymer courses (Polymer Physics, Thermodynamics, Materials Characterization) with consistently high evaluations and graduated record numbers of PhD students and post-docs at Cincinnati; students particularly remember his focus on bringing them into the field through plant tours. He was a frequent speaker at American Chemical Society (ACS), American Physical Society, Materials Research Society and many other international conferences. He was recognized as a Fellow by the American Physical Society in 2008 and by the ACS Polymer Science, Materials and Engineering Division in 2021.

Beyond academia, Greg devoted himself to global partnerships that leveraged polymer science for societal benefit. When asked '*why are you doing this*?', his answer was simply '*because someone needs to do it*'. With this motto, he founded and led 'NanoPower Africa', a State Department supported consortium of African universities and US national laboratories that trained African scientists to develop solar streetlights, pH/soil-moisture sensors and deep-cycle batteries for rural communities. A particular contribution was an undergraduate course 'Solar Power for Africa', through which Greg brought undergraduate students from the US and Ethiopia together in engineering-focused development projects conducted hands-on in Haramaya, Ethiopia. The cultural connections resulting from these collaborations altered students' careers and perspectives, and even generated marriages. From Addis Ababa to Cape Town, Greg demonstrated that science lifts people and fosters human flourishing.

Greg also served on advisory boards for national facilities–neutron sources, synchrotron beamlines and the LENS neutron facility at Indiana University. He was a frequent collaborator with industry giants such as Procter & Gamble, LyondellBasell and Bridgestone. Through these engagements he translated fundamental polymer behavior into practical solutions for everything from shampoo viscosity to composite-material strength.

His sudden passing leaves a void that will never be filled, but the impact of his work, the mentorship he practiced and the laughter we shared will remain with all of us. Greg's life reminds us that curiosity, generosity and the desire to help others are the true hallmarks of a great scientist.

The small-angle scattering and polymer communities as well as countless students and collaborators will remember Gregory Beaucage as a brilliant scientist, an inspiring teacher and a dear friend. His legacy lives on through the USF, through the students he trained and in the lives he touched by bringing technologies to underserved regions. We will miss him deeply.

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