

SPLAT II

SPLAT II is a one-of-a-kind single particle mass spectrometer that was designed, constructed, and deployed at EMSL to allow users to precisely characterize the physical and chemical properties of nanoparticles. SPLAT II yields quantitative information on particle physical and chemical properties in the laboratory or in the field—even aboard an aircraft. In the context of EMSL’s integrated problem-solving environment, the unique capabilities of SPLAT II enable vital research across a range of scientific fields.

Research Applications

Fundamental science – characterizing the properties and behavior of matter on the nanoscale

Atmospheric chemistry – understanding the processes that control atmospheric aerosol life cycle

Climate change – uncovering and helping model the relationship between atmospheric aerosols and climate

Emissions reduction – helping develop cleaner vehicle technology by characterizing the properties of exhaust emissions and particulate filters

National security – developing and testing ultrasensitive detection of aerosolized biological and chemical warfare agents

Nanotechnology – providing the tools to monitor and characterize nanoparticles in real time



Quick Specs

- ▶ Sensitivity: Detects 1 particle cm^{-3} (>125 nm) per second
- ▶ Sizing Rate: >500 particles sec^{-1}
- ▶ Mass Spectra Rate: 100 particles sec^{-1}
- ▶ Size Range: 50 nm to 3000 nm
- ▶ Sizing Precision: better than 1 nm
- ▶ Ion Formation: UV ablation or IR evaporation/UV ionization
- ▶ Chemical Analysis: Time-of-flight Mass Spectroscopy
- ▶ A/D Converter: 14-bit vertical resolution
- ▶ Particle Shape: Distinguishes spherical/aspherical particles in real time

EMSL's SPLAT II Offers:

Multi-dimensional, versatile characterization – measures size, density, dynamic shape factor, morphology, fractal dimension, hygroscopicity, and composition; yields quantitative information for all particle types, including volatile and non-volatile fractions of internally mixed aerosol particles commonly found in the atmosphere and engine exhaust

High temporal resolution – permits rapid characterization of quickly changing samples

High sensitivity – allows characterization of particles with low number concentrations

Wide size range and low size limit – is essential for characterizing nanoparticles, atmospheric aerosols, and engine emissions

Sizing precision – allows researchers to follow physical and chemical transformation of particles with submonolayer resolution

Companion software tools – SpectraMiner and ClusterSculptor classify, visualize, and mine results from SPLAT's complex data sets.

To learn more about SPLAT II and how it is being applied to EMSL users' research, see: www.emsl.pnl.gov/capabilities/viewInstrument.jsp?id=34020.



EMSL, a national scientific user facility, is available for free for open research. Learn how to become a user and about upcoming proposal calls at <http://www.emsl.pnl.gov/access/calls/>

ALLA ZELENYUK

Co-Inventor of SPLAT II
Senior Research Scientist
alla.zelenyuk@pnl.gov
(509) 371-6155

PNNL-SA-73141



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