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EMSL In Brief
Environmental Molecular Sciences Laboratory

EMSL "Attracts" New 12-Tesla Magnet

EMSL recently installed a powerful new magnet that is expected to enable unprecedented "top-down" capability for studying proteomics. Manufactured by Magnex Scientific Ltd. for Bruker Daltonics, the 12-tesla superconducting magnet was set up in EMSL's High-Performance Mass Spectrometry Facility (HPMSF).

"With the higher field of 12 tesla, the user achieves increased precision and accuracy in their measurements," says Harold Udseth, HPMSF Technical Group Leader, who indicated that EMSL and the Mayo Clinic are two of very few entities to possess a mass spectrometer of this strength.

Proteomics is the study of a collection of proteins that make up a cell under a specific set of conditions. Research in Udseth's facility has historically focused on "bottom-up" proteomics that uses mass spectrometry to detect peptides, leading to positive identification of the presence of particular proteins in a cell. While this technique works well for identifying a protein's presence, it cannot detect the actual form of the protein in more complex organisms.

The new 12-tesla magnet introduces top-down analysis, which helps researchers understand the role, function, structure, and changing nature of complex cellular proteins. The magnet provides a unique mass spectrometry tool complementary to repetitive bottom-up methods that result in a scientific understanding of the protein as well as potential application.

"During bottom-up analysis, you have to repeat lengthy experiments enough times to obtain the statistics the researcher requires," says Udseth. "With a targeted list of proteins of interest determined through bottom-up analysis, researchers can further their research using the top-down capabilities of the 12-tesla magnet to devise experiments for actually understanding the role and function of a protein."

Udseth hopes to make the 12-tesla instrument available this summer for user research and to support the Membrane Biology Grand Challenge, a multi-institutional effort that will study cyanobacterial membranes—systems that researchers expect will provide an understanding of cell interaction and how the interaction translates to behavior at the cellular, organism, and population levels.

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