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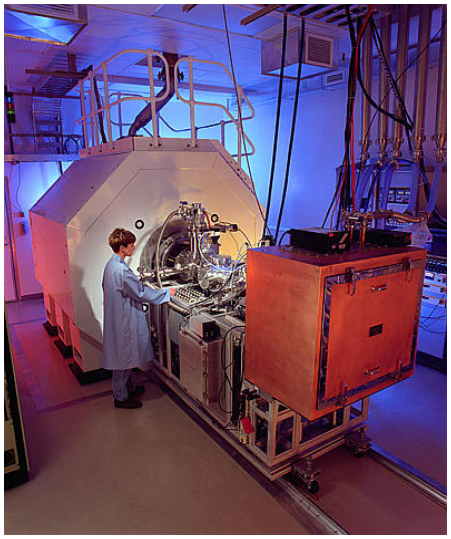
EMSL In Brief
Environmental Molecular Sciences Laboratory

EMSL Proteomic Tools Aid Publication of Bacterium Research

A team of researchers from the University of Texas Health Center at Houston, University of Wisconsin-Madison, and Pacific Northwest National Laboratory (PNNL) has used the state-of-the-art proteomic tools located in the Environmental Molecular Sciences Laboratory (EMSL) to study the environmentally important bacterium, *Rhodobacter sphaeroides*. The results of the research have been reported in the *Journal of Proteome Research* [5(8):1940-1947] and *Journal of Microbiological Methods* (in press).



EMSL mass spectrometry capabilities, such as the 11.5-tesla system, help researchers study the proteomes of environmentally important bacteria with potential applications such as hydrogen production and metal reduction.

The articles describe how the researchers probed the photosynthetic lifestyle of *R. sphaeroides* on a protein level and compared their observations to those previously reported. *R. sphaeroides* can alternate aerobic and photosynthetic energy generation, and its photosynthetic apparatus is linked to its capability to perform a number of environmental applications, including metal reduction, nitrogen fixation, carbon dioxide assimilation, and hydrogen production.

The researchers performed the global proteome analysis of *R. sphaeroides* using PNNL's accurate mass and time (AMT) tag approach to compare aerobic and photosynthetic proteomes. The analysis revealed proteins directly and indirectly associated with the photosynthetic culture of *R. sphaeroides*, and the location of these proteins within cellular fractions, such as the outer membrane and cytoplasm. As a result of the AMT tag-based analysis, the researchers were able to identify a diverse set of proteins that will help in developing and connecting models of photosynthetic behavior.

This research is the first step toward studying the biology of photosynthesis in *R. sphaeroides* using large-scale proteomic techniques. The next step is to be able to confidently distinguish proteins in subcellular fractions, then to evaluate protein abundances in aerobic and photosynthetic cell states.

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