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News

Microbiologist awarded $21.8 million grant

By Mike Parrish, Collegian Staff
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The Department of Energy, (DOE) awarded a $21.8 million grant over a five year period to a University of Massachusetts microbiologist Derek Lovley this month.

Lovley, a professor of microbiology was awarded the grant after presenting his proposal in front of a DOE panel in Washington D.C. this May.

The proposal consisted of his research on Geobacteraceae, the microbial family containing energy-harvesting abilities. Lovley's intention in his research, along with the help of graduate students, is to harness the single celled organisms' ability to generate electricity. More specifically the research would begin with finding the rate at which the Geobacter produces electrons and how. Along with discovering these aspects it is important to find what environments the microbe works best in, Lovley stated.

Lovley discovered the microbe himself in the Potomac River in Maryland in 2002. He eventually discovered that it could grow on uranium and iron. He began his research over ten years ago, before coming to work at UMass, when he worked with the U.S. Geological Survey. It has been found through his research that microbes feed off iron to produce energy in the form of electricity.

Essentially, the microbe works as a battery. It strips electrons and dumps them onto an electrode. From there, the electrons flow to another electron containing oxygen and electricity is produced.

Another way to picture it, professor Lovley says, is "it acts like a wire but it's not a metal, it's a protein." Geobacter produces a filament extending off of the cell, resembling something similar to a neuron.

It does not work in the same respects as a neuron, it is a protein and no microbe has been seen to work electrically. It is possible for this microbe to be used as a way of producing nanowires, which is how an electronic device would be powered.

"Microbial fuel cells are a more recent discovery and it is still under development," said Lovley. "There's potential for many different ideas but short term would be to power electronics."

At this point it can be used as a localized power where wires run directly to a device such as a remote controlled robot.

It is possible for the microbe to feed off of organic material. It is plausible that at some point it could power wireless devices. This aspect of the research would not be for sometime to come due to its recent discovery.

The Geobacter has no hazardous affects, because it is a natural constituent of the environment. The microbe also has been found to clean pollution such as uranium and has potential to be used for environmental cleaning purposes. Lovley found the microbe converts uranium into a form that is non-soluble in groundwater presenting an easier task of removal. For now, its ability to produce electricity most optimally is a more pressing aspect of research given a need for alternative energies.

The DOE has awarded over $92 million towards a better understanding of microbes and their environments to six researchers including professor Lovley.

Over his ten years of dedication to his research at UMass he's been awarded over $42 million for past projects including this one. He extends his appreciation of the support given by the university as well as the university showing their appreciation to him by revamping the microbiology department in Morrill and supporting his research.

More information on Lovley's research can be found through UMass' Web site: umass.edu.

At the microbiology office inside the Morrill building, there are videos previewing electronics he has been able to power with the Geobacter, such as a robotic dinosaur and multiple battery units he has built using the microbe to power light bulbs.