

Opening a new frontier in biophysics: Vermont company boldly goes where no one has gone before

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It takes courage to announce that you are boldly going where no researchers have gone before, but that's exactly what Vermont Photonics is doing. The research and development company based in Bellows Falls is about to launch the next phase of its quest to learn how to "talk" to biological molecules.

"This is a genuinely new frontier in biological physics," says company president, physicist Michael Mross. And he's not exaggerating.

For the past decade, Vermont Photonics has been designing and fine-tuning the technology necessary to work in the Terahertz frequency region of the electromagnetic spectrum, the heretofore neglected area of the spectrum between microwaves and visible light. It turns out that biological molecules, such as certain proteins, as well as the nucleic acids, DNA and RNA, resonate at specific Terahertz frequencies, making it possible to "communicate" with them for the first time.

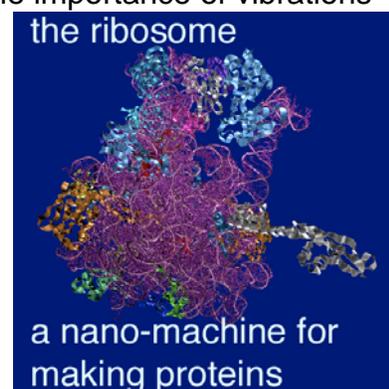
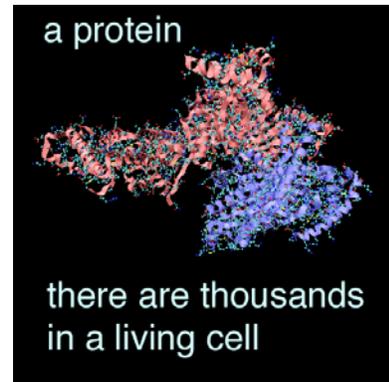
"We expect to develop some extremely valuable intellectual property over the next five years," says Mross, "learning how to alter biological function by communicating with molecules in a way that humans have never done before. This is a pretty bold claim, but we're convinced we can do it."

Such research has the potential to dramatically change how scientists deal with living cells if it becomes possible, for instance, to adjust, tweak or trigger protein activities that are crucial to the functioning of a healthy cell.

Dr. Kou-Chen Chou, Chief Scientist and professor at the **Gordon Life Science Institute in California**, has been studying the importance of vibrations in DNA and proteins for many years, and he is intrigued by what the research Vermont Photonics is doing will reveal about how cells function.

"The study of low-frequency or Terahertz frequency motions in biomacromolecules," says Chou, "holds a very exciting potential that could revolutionize biophysics, molecular biology and biomedicine. The profound dynamic mechanisms of many marvelous biological functions can be revealed at the molecular or cellular level by investigating the low-frequency (or Terahertz frequency) motions therein."

The results of venturing into this new frontier are unpredictable, but Mross sees a tremendous potential for the proprietary research they will be doing over the next five years.



“I am an optimistic entrepreneur,” says Mross, “and only time will tell, but if we are successful, you can be sure it *will* revolutionize biomedicine. Furthermore, we expect our success to have profound implications for some of the other emerging concepts at the edges of biological science,..... for example the stem cell re-programming being worked on at the Institute for Stem Cell Biology and Medicine at UCLA, or the synthetic organism development for renewable energy being worked on at the J Craig Venter Institute.”

Mross, along with his business partner Thomas Lowell, who brings his engineering talents to the project, have already invested several million dollars in getting to this stage, along with another million or so from the federal Department of Defense to help develop the enhanced laser technology needed to work as a Terahertz source.

Vermont Photonics is now recruiting a team of physicists, biologists and engineers to develop the techniques for “talking” to biological molecules, but this next phase will take a significant financial investment. To help explain the aims of the project to potential investors, Mross and Lowell have produced a colorful 20-minute DVD to educate investors on the basics of the very new technology, physics and biology behind “communicating” with living molecules.

Lowell and Mross are well aware that being on the forefront of new and unexplored research territory is both thrilling and demanding, and because of this, they are strong supporters of others who are working on cutting-edge science. This fall, Vermont Photonics once again provided significant financial and organizational support for the third annual Conference on the Physics, Chemistry and Biology of Water, an international gathering of scientists investigating unusual properties of water, specifically the details of its crucial and complex role in living organisms. It was held at the Mt. Snow Resort in West Dover, Vermont. It is through meetings like this, as well as through regular discussions within a growing network of scientists from around the world, that Vermont Photonics is forging a new model for the development of valuable intellectual property based on interdisciplinary collaboration.

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