Tiny technology hopes to make big impact

INSTITUTE PARTNERS WITH RAYTHEON TO RAISE DEFENSE WITH NANOTECHNOLOGY

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Welcome to a world where everything is smaller, faster, stronger and always reliable. In Nanoworld, the nation's military can detect dangerous activities or substances within seconds and doctors can detect cancer long before it even appears.

This is the world the Institute for Cell Mimetic Space Exploration envisions. Defense and aerospace technology supplier Raytheon shares this vision, particularly in areas of defense and aerospace, and has formed a partnership with CMISE that is hoped to revolutionize defense technology.

"Raytheon believes nanotechnology will have a great impact in our industry," said Peter Pao, vice president of technology at Raytheon.

Nanotechnology studies physics and chemistry at the atomic level, called a nanometer, which is one billionth of a meter.

At the institute, big things are expected from the tiny cells that researchers study.

Cells are extremely efficient: able to switch genes on and off, divide, communicate with other cells and many more things – all at the same time.

Using machines such as the Fourier Transform Infrared Spectroscopy, researchers hope to understand how cells convert chemical energy into motion.

FT-IR is able to determine the frequencies and intensities at which samples of DNA, RNA, proteins and different cell membranes absorb radiation. This ultimately helps identify the chemical makeup of the sample since chemical groups are known to absorb light at specific frequencies.

Understanding the mechanisms involved in cellular motion can lead to molecule-sized devices to help humans combat illnesses.

"This is a long way off though," said Professor Chih-Ming Ho, associate vice chancellor for research at UCLA and director of the institute.

Real world application of current research however, is not too far off.

The partnership has focused on two specific projects that is expected to yield results within five to 10 years.

Professor Bruce Dunn, CMISE energetic research group leader, will be researching properties of electrochromic filters in the infrared region.

Researchers predict Dunn's findings will greatly improve infrared optical systems, such as sensors used for aerospace, defense and security purposes.

The second project, headed by Professor Ming Wu, CMISE energetic interdisciplinary research group faculty member, focuses on developing new technology for steering optical beams and improving communications.

"This will be especially helpful in remote sites," said Wu.

The collaboration between UCLA and Raytheon is expected to last.

"We are basically looking at what are today's problems and we try to identify the technology that can help solve these problems," said Dr. Alice Muntz, associate director of development.

By partnering with Raytheon, the institute can help jump-start their technology and supplement their research and development since most corporations have cut their internal research drastically, Muntz said.

"It's an advantage for both because we can find an exiting route for our technology," Ho said.

Currently, the institute is largely funded by a five-year, $15 million grant from NASA, with renewal in five years for a total of $30 million.

"NASA hopes CMISE will be self-sustaining in 10 years," Muntz said.