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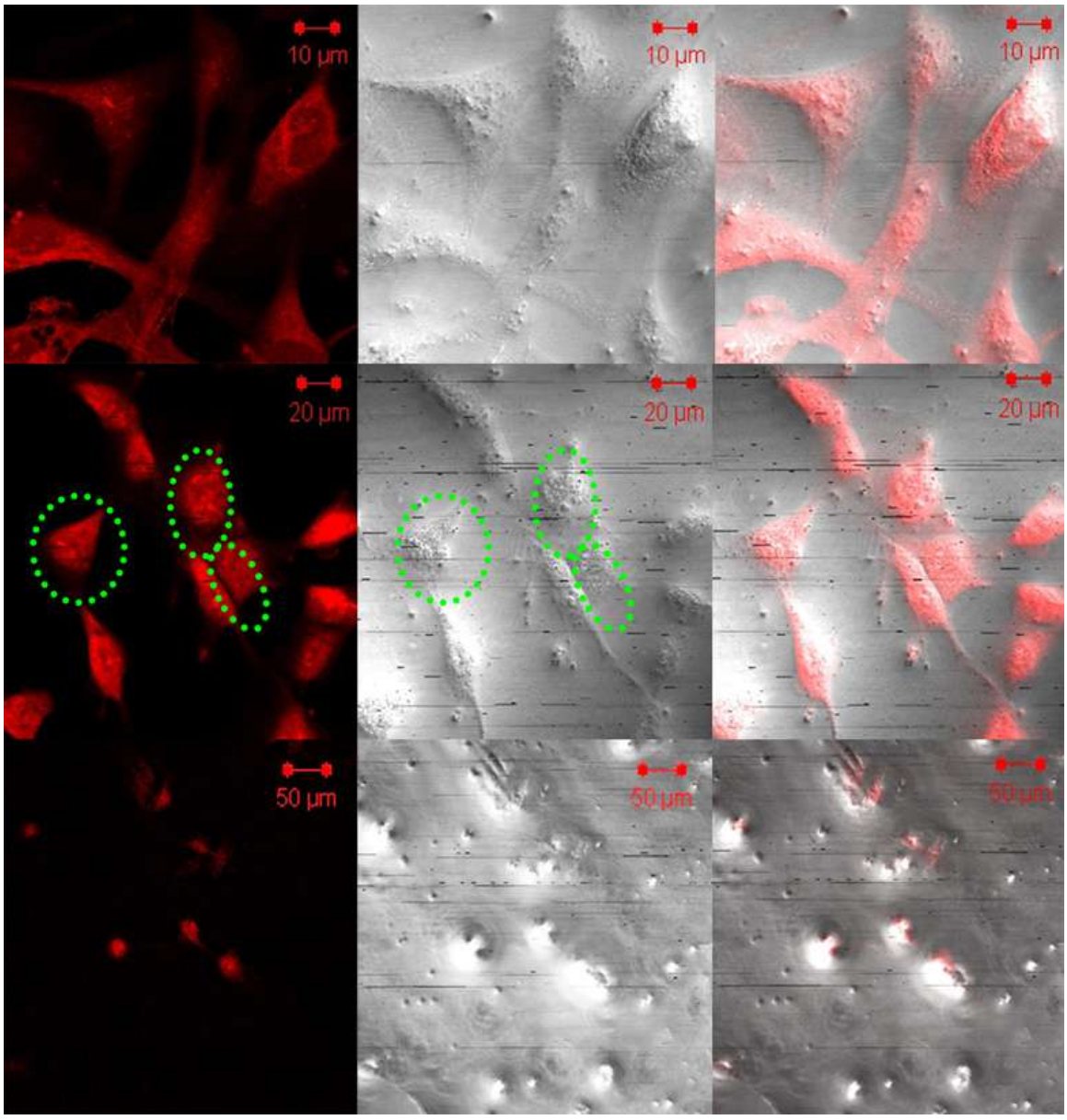
Tiny particles have big potential, speaker says



This sequence of images demonstrates how nanoparticles linked to antibodies induced cell death in cancerous cells when researchers applied a light source. From the top row: cancer cells after no light, damaged cells 30 minutes after light and cell death 90 minutes after light. Image credit: Nanobio Interface Group at the Center for Nanoscale Materials (E. Rozhkova and I. Ulasov)

The small science of nanotechnology could make big changes in energy and medicine yet it is nanotechnology's potential in something even smaller - particle physics - that appeals to one Fermilab scientist.

Although nanotechnology has no direct application to particle physics, Technical Division's Emanuela Barzi said she wouldn't be surprised if Fermilab eventually used nanotechnology. She recently hosted a colloquium talk by Tijana Rajh, a scientist at the Center for Nanoscale Materials at Argonne National Laboratory.

"Because nanotechnology is such a young field and it's making such fast progress, my take on it is that it's very possible that we would be able to find applications in what we do at the laboratory," Barzi said.

Rajh, who spoke on Oct. 14 in a general talk about advances in nanoscience, said scientists are entering a period of rapid advancement in nanotechnology.

"We are at the beginning of the threshold into big discoveries," Rajh said.

Nanotechnology studies the behavior and applications of particles between 1 and 100 nanometers, a scale where ordinary materials exhibit novel properties and experience changes in optical, electrical and magnetic behavior.

Because of nanoparticles' size and ability to couple with biomolecules, scientists hope that the particles could target specific cells and find possible medical applications. By binding nanoscale titanium dioxide to a natural protein that recognizes unhealthy cells, scientists could target only these cells for therapy.

Scientists have found that by layering lattices into multijunction solar cells, they can triple the efficiency of conventional solar technology, but at a cost of $75,000 per square meter. Rajh said that by using nanotechnology, scientists could heat up nanoparticle assemblies that will bring them closer to nanoparticle superlattices, which could be more efficient and cost-effective than conventional manufacturing.

After the talk, Barzi was enthusiastic about nanotechnology's potential. She said she's discussed with Rajh about organizing a small working group at Argonne to look into the technology's applications in superconductor material.