Research goes to market

Superclusters fast-track CSU discoveries to the world at large

by Paul Miller

Fast lane of technology: Joe Guiles, Terry Opgenorth, and Tim Reeser are the chief operating officers of CSU's Supercluster program.

In this age of global challenges and austere economies, Colorado State University has hit on a successful formula that's moving innovative biomedical and technical research more efficiently into places that benefit the most.

Through CSU's Supercluster programs, introduced to campus in 2007, scientists throughout the University are improving quality of life – whether human or animal – by taking research innovations to global marketplaces at an accelerated pace.

When Bill Farland, CSU's vice president for Research, thinks about Superclusters, he sees endless possibilities.

"We're committed to expanding the research and educational components of promising technologies and innovations," he says. "The benefits are everywhere, from development of vaccines to finding ways to fight cancer to figuring out new, cleaner energy resources. Advancing the University's interdisciplinary research also leads to jobs, economic development, and more robust societies in general."

The return on investment for CSU's invention disclosures has been impressive, Farland adds, even though the lag time from innovation to income can amount to years. "We've had a 136 percent increase in invention disclosures in our clean energy, infectious disease, and cancer Superclusters since 2007," he says. "A 136 percent increase in three years is incredible."

Clean Energy Supercluster

A priority for Tim Reeser, chief operating officer for Cenergy – the business arm of the Clean Energy Supercluster – is to look closely at CSU people who drive technology and innovations.

"We look for two things: people who are passionate about their specific technology and those who are interested in exploring ways to move their discoveries out of the lab and into the global marketplace," he says.

He didn't have to search long before finding Amy Prieto, assistant professor of chemistry, and her lab team, who are developing new nanotechnology lithium batteries. The batteries are under development to be significantly stronger, cheaper, and longer-lasting than current batteries. With the help of Cenergy seed grants and CSU's Fund1, a 10-year private investment fund, Prieto Battery now operates on campus, and the company may soon deliver souped-up, scaled-down technology to drive society's devices.

"The first markets we're looking at are cell phones and electric bikes," Prieto says. "A long-term goal is electric cars and electric fleet vehicles. If that goes well, we'll move into bigger markets such as cars, buses, and trucks."

"Amy has a deep interest in her research and an extraordinary teamwork approach," says Reeser, who is CEO of Prieto Battery. "One important part of commercializing technology like Amy's is the creation of jobs – she has three Ph.D. alumni from CSU now working full-time in her lab, and who knows how many more

employees will join the business down the road."

One of Cenergy's key goals is to help scientists like Prieto with the nuts-and-bolts of building start-ups. If business planning, marketing analysis, funding, and similar business concerns don't fall within the purview of researchers on campus, Cenergy steps in.

"Faculty are sharp people who learn quickly, but some don't want to become experts in business," Reeser says. "We've been able to partner effectively with them and take care of setting up their businesses, which allows them to focus on the science and technology.

"Another very satisfying result of developing Prieto Battery is that we've created a template we're following across all the Superclusters," he adds. "With my colleagues Terry Opgenorth and Joe Guiles [chief operating officers of NeoTREX in cancer research and MicroRx in infectious diseases, respectively], we're working to make sure the template we built for Prieto will work for other spin-offs as well.

"Because of that groundwork, each subsequent business endeavor in any of the Superclusters can move forward more quickly with less red tape. We're excited about this."

Infectious Disease Supercluster

It's not surprising that Joe Guiles has to think a few moments before picking some top examples of research in the Infectious Disease Supercluster, which includes 150 faculty and research staff, $50 million in annual research funding, and a handful of University Distinguished Professors.

"Overall, research in finding new therapeutic or diagnostic approaches for human and animal infectious disease represents some leading examples in the Supercluster," he says. "In particular, we have long-standing expertise here in mycobacteria, including tuberculosis. CSU has some world-leading researchers in tuberculosis."

Last year, CSU was awarded for the first time a research grant from the nonprofit Global Alliance for tuberculosis. Guiles notes that Dean Crick, director of Mycobacterial Research Laboratories and professor in the Department of Microbiology, Immunology, and Pathology, is a lead investigator who works closely with the alliance.

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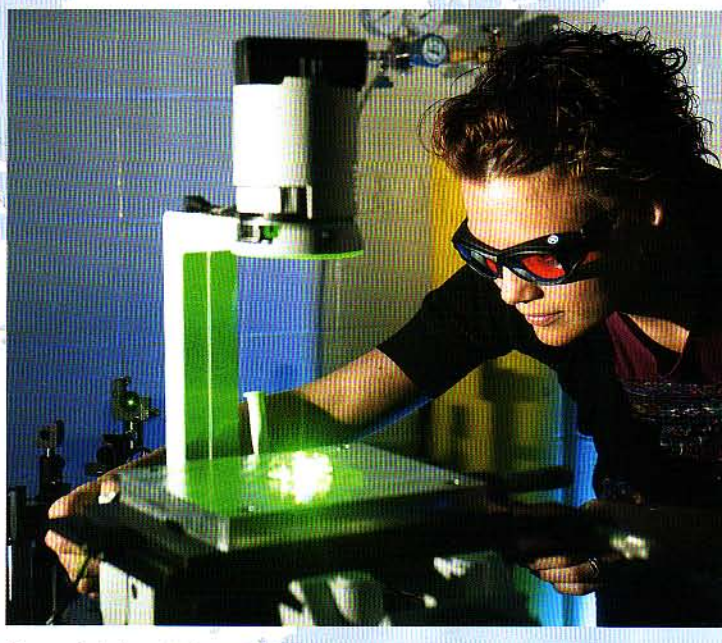
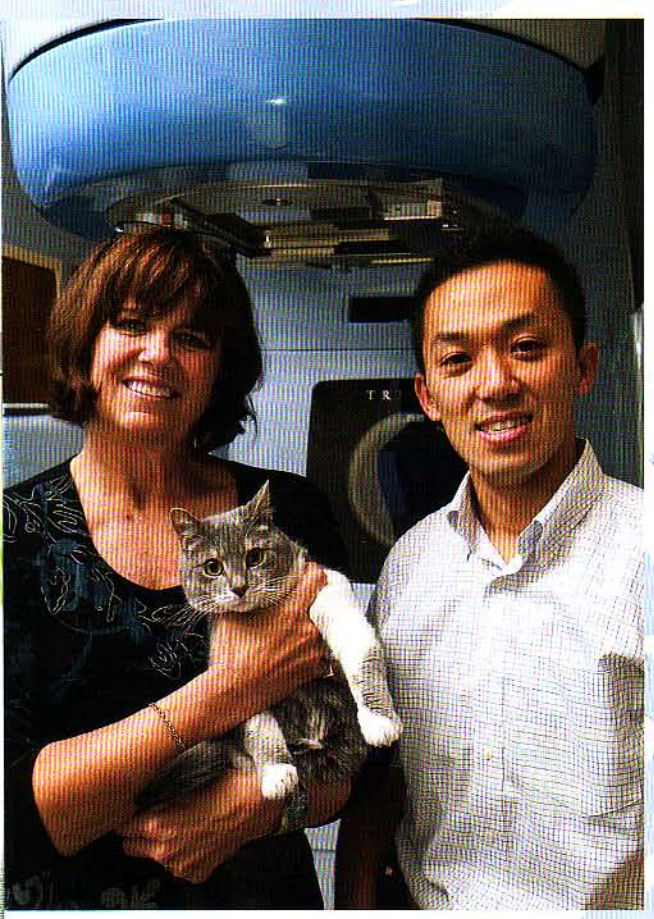
"Dr. Crick's work is in early stages, but his lab was selected because of its unique approach researching a target in the pathogen that, if blocked, could kill TB bacteria and could at some future date become a treatment option," Guiles says. "The work by Dean and the world-leading experts in the MRL is just one example of a collective research effort to identify approaches to combat widespread diseases like TB, particularly drug-resistant strains. They're also working on new ways to detect the presence of TB – the earlier it's detected, the more effective the treatment."



Focused: Aubrey Weigel, Ph.D. student in biomedical engineering, adjusts a laser in Assistant Professor Diego Krapf's lab at CSU's Engineering Research Center.

Scientists in the Infectious Disease Supercluster also are working on quicker methods for detecting important pathogens such as *E. coli*, *Salmonella*, *Listeria monocytogenes*, and enteric viruses, all pathogens which, if undetected, result in significant consequences to public health. An example of the research being done to detect such pathogens is by animal sciences Professor Lawrence Goodridge, who, along with Guiles, recently formed Lumiere Diagnostics to commercialize products and methods to detect unwanted pathogens in the food supply.

"Right now, there's no good way to detect contamination of food such as spinach after it's been washed," Guiles says. "Once commercialized, Dr. Goodridge's technique could allow food industry producers, wholesalers, and retailers to test wash water and find out if the food is still contaminated with *E. coli* or other pathogens."



Three's company: Environmental and Radiation Health Sciences Professor Susan LaRue, radiation oncology Ph.D. student Hiroto Yoshikawa, and a feline friend take five in front of an image-guided radiotherapy system.

Cancer Supercluster

Research and innovation at the Cancer Supercluster concentrates in part on translational research, which seeks treatments for animals that can be applied to humans. Early this year, CSU signed an agreement with Jovesis Inc. of Napa, Calif., to develop and use liposome-targeting technology for cancer therapeutics.

"Initially, the CEO of Jovesis came out and visited scientists here at the Animal Cancer Center," says Steve Foster, director of business development for NeoTREX, the enterprise arm of the Cancer Supercluster. "The relationships that developed ultimately led to a license that allows Jovesis to take some data and technology developed here and license that into the company. They're hoping to create products that can treat certain types of human cancer."

Foster says it may be another 10 years before human clinical trials begin at Jovesis, a fairly typical time frame for studies that require major infusions of venture capital.

"It's important to understand that, in general, the kind of research that's done at the University is very early in terms of what will eventually become a product," Opgenorth says. "That's true in almost all areas of research and especially pertinent to those that require human clinical studies."

KromaTiD, a start-up company in Fort Collins, also has licensed technology from the University. The company is in the early stages of developing technology in cytogenetics, which includes molecular diagnostics for cancer. The technology looks at chromosomes in cells to find aberrations that could be linked to diseases. Three founders of the company are Andrew Ray, associate professor; Joel Bedford, professor; and Susan Bailey, associate professor, all in CSU's Department of Environmental and Radiological Health Sciences.

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"Their day job is professor and night job is company," Opgenorth says. "NeoTREX helps them with anything they need to keep the company moving forward because there's considerable potential for them and for the University if they're successful – and that success isn't limited to saving lives. A lot of indirect costs and sponsored research money comes back to CSU, and the company hires graduate students, technicians, and others to work in their labs.

"Research income like that is a major economic driver for the University and for the region."

Opgenorth speaks for the business arms of all the Superclusters when he says NeoTREX searches, both proactively and after-the-fact, for partnering opportunities for faculty. "We bring in a fair number of companies," he says. "There's no set agenda around a particular technology, but we introduce outside interests to the expertise here at CSU and see if there may be opportunities to form research partnerships that could lead to product development.

"It's good to see research leave the University and have a global impact," Opgenorth adds. "We can wave flags all day long about how great the research is here, but until a product is actually bought by somebody and proves to be useful, there's basically no societal impact."

"Superclusters began when CSU took traditional technology transfer and decided to try it a different way," Foster says. "And it's working." ◆