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Researchers collect and reuse enzymes while maintaining bioactivity

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Clemson University researchers are collecting and harvesting enzymes while maintaining the enzyme's bioactivity. Their work, a new model system that may impact cancer research, is published in the journal *Small*.

Enzymes are round proteins produced by living organisms that increase the rate of chemical reactions.

"We found a robust and simple way of attracting specific enzymes, concentrating them and reusing them," said Stephen Foulger, professor in the School of Materials Science and Engineering at Clemson. "The enzymes are still functional after being harvested."

Isolating a single type of protein from a complex mixture is the most difficult aspect of the purification process. It is vital to determine the function, structure and interactions of the protein.

The researchers baited a nanoparticle to capture and recycle an enzyme. They found a way to attach an enzyme's target on the surface of a particle, allow the enzyme to bind to it, remove the particle and determine that the enzyme is still functional.

"We took a protein that was being produced in a soil and placed its food source on the outside of a nanoparticle and the protein essentially grabbed onto the food source," said Foulger. "We froze the enzyme in place and removed the particle and thus found a commercially viable way to harvest these proteins."

"This baited particle approach provides a very efficient means for isolating complex enzyme systems for use in biotechnology," said Vincent Rotello, a chemistry professor at the University of Massachusetts Amherst and leading researcher in the field. "This method also provides considerable promise for biomedical applications."

The research established a universal model for concentrating and extracting known enzyme pairings, but it can be an invaluable tool in recognizing unknown ones.

"This model is foreshadowing for what we're doing with cancer research because we're beginning to focus on the 'outside' of nanoparticles to sequester specific proteins that direct cancer cell growth," said Foulger.

The researchers' goal is to alter the cellular concentration of critical proteins in cancer to disrupt the cell's ability to spread, thereby controlling its growth in the body.

Provided by Clemson University

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