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Cal Poly Pomona Awarded \$178,000 Grant to Better Catalogue Cells

POMONA, Calif.— The National Science Foundation has awarded Cal Poly Pomona a \$178,000 grant over two years to improve the way cells and their components can be separated and identified.

Dr. Timothy Corcoran (chemistry), Dr. Hossein Ahmadzadeh (chemistry) and Dr. Amar Raheja (computer science) began working together this summer to develop a technique called Supercontinuum Rapid Excitation-Emission Matrix, also known as ScREEM, to effectively catalogue cells and their components.

ScREEM is a fluorescent detection method that facilitates the separation and identification of the contents of a cell, similar to sorting a large basket of laundry. The task could be easier if the laundry load was pre-sorted. In this case, cell contents flow down a tiny glass pipe in the presence of an electric field, in a process called capillary electrophoresis. The fluorescent probe tags are added which bind to selected biomolecules present in the cell contents. The new instrument allows simultaneous monitoring of fluorescence from a wide variety of different colored tags.

This cell-by-cell, piece by piece, protein-by-protein level of detail has not been previously obtainable. This process could ultimately lead to increased efficiency in research and the ability to fundamentally ask new questions in a broad range of research. The technique may also be adapted to other separation techniques and detection methods in biology.

The Cal Poly Pomona team, including Dr. Robert Talmadge (biology) plans to demonstrate this method by examining the mitochondria – the powerhouses of a cell – in single muscle cells.

Four undergraduate chemistry students are currently working on the research.

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“The students involved in this work take a highly hands-on approach to developing methods and instruments that may make a global impact,” said Corcoran. “These experiences prepare and equip them to be future leaders in science and engineering.”

Corcoran, a physical chemist and laser specialist, is the principal investigator. He leads the team in the development of the optics and hardware for the laser detection system; their prototype is nearly complete. The sampling and separation aspects, which have already been assembled, were created using Ahmadzadeh’s expertise in analytical chemistry and capillary electrophoresis. In addition, Raheja, a computer science specialist, and his students are creating data analysis software to collect and process the large volumes of data the ScREEM detector camera will produce. Talmadge will contribute to the mitochondria work and cell sampling.

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ABOUT CAL POLY POMONA — Striking a balance between urban excitement and rural charm, Cal Poly Pomona is nestled in 1,438 rolling acres in the heart of sunny Southern California. With 3,000 faculty and staff to serve 21,500 students, Cal Poly Pomona’s mission is to advance knowledge by linking theory and practice while preparing students for leadership and careers in a multicultural world. The university seeks to place learning at the center of every program, course, and activity on campus. Students can apply their knowledge through hands-on projects, collaborate with faculty members on research, and participate in valuable internships and service learning programs. Eight colleges (agriculture; business administration; education; engineering; environmental design; hospitality management; letters, arts and social sciences; and science) offer 56 undergraduate and 23 graduate degrees, as well as 8 credential programs.