Ever since the 1940s, when medical imaging was first employed to view the inner workings of the human body, the monochromatic nature of those images has limited medical professionals in their ability to consistently and correctly interpret fine details in the image. Large solid structures are clearly visible, but smaller features – particularly in soft tissue – are difficult to differentiate. Until recently . . .

Ultrasound images are generated by introducing low frequency sound waves into the body and analyzing how those waves bounce back. The quality of bounce – the “scatter” -- is translated and displayed as shades of black, gray, and white.

Kevin Parker, the William F. May Professor of Engineering in the Department of Electrical and Computer Engineering at the University of Rochester, recently came across a set of 19th Century mathematical functions that struck him as remarkably similar to ultrasound pulses. By applying these functions described by Charles Hermite, to the scatter of ultrasound images, Parker has been able to produce ultrasound images in color. This allows a differentiation between normal and abnormal tissues, blood vessels, fat, scar tissue, and other biological structures.

Parker’s findings have been detailed in Physics in Medicine & Biology. The University has produced a brief video (Re-thinking Ultrasound: Adding Clarity through Color) explaining this innovation.

The University of Rochester has filed for patent protection on this discovery, and UR Ventures is seeking a commercial partner to help get this breakthrough into doctors’ offices.
Recently, The Science Coalition released the third volume of “American Made Innovation: Sparking Economic Growth,” their occasional report highlighting companies created around federally-funded research. The report showcases how federal investment in basic scientific research benefits the public through increased economic activity.

In this volume, two University of Rochester startups are featured: Adarza Biosystems, Inc. and Clerio Vision, Inc.

From the Science Coalition’s company database:
Adarza Biosystems, Inc.: Adarza Biosystems is a leading developer and manufacturer of label-free biosensor assays and instruments servicing life science research, drug development and in vitro diagnostics customers. Adarza’s products and services utilize its proprietary Arrayed Imaging Reflectometry ("AIR") detection platform that is capable of rapidly identifying and quantifying a series of biological target analyte species in a fluid sample, without chemical labels or complex processing. The AIR technology offers key performance benefits in sensitivity, speed, multiplex arrays, sample size, dynamic range, ease of use and industry leading low cost of use. Adarza products address broad quantitative analyte detection applications, including cancer biomarkers, drug and vaccine development, allergy, immunology and infectious diseases research.

Clerio Vision, Inc.: Sometimes the key to moving forward is seeing things in a new way. That’s what happened when Wayne Knox, a professor of optics and physics and the director of the Institute of Optics at the University of Rochester, was presenting his work on using ultrafast lasers to change optical materials like intra-ocular lenses to a group of scientists discussing lasers, optics, and human vision. Krystel Huxlin, an associate professor of ophthalmology at the Flaum Eye Institute, part of the University of Rochester Medical Center, chimed in with a question: “Have you ever tried this in living materials?” With that, a collaboration was born, and the two embarked on the basic research and technological validation that ultimately led to the formation of Clerio Vision, Inc. to pursue commercialization of their technology. Funding from the National Institutes of Health helped support their research.

The full report can be accessed and downloaded at Sparking Economic Growth. Earlier volumes of this report featured Rochester startups iCardiac Technologies, Koning Corporation, Praxis Biologics, Science Take Out, and Vaccinex.