

Strengths & Opportunities for Improvement of I/UCRCs

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Context

- n Raytheon Company is very active in I/UCRC memberships
- n Raytheon was the first Industry member in the Center for Metamaterials (CfM) formally established in 2010 as the first I/UCRC specializing in metamaterials
- n I was the first Chair of the CfM Industrial Advisory Board and am still the main POC at Raytheon for this I/UCRC
 - Worked closely with Center Director Professor David Crouse and others at CUNY and UNCC to help define the Center Bylaws and select first set of university research projects
- n CfM projects have produced tools and innovations that benefit Industry members, but CfM and other I/UCRCs need to work closely with Industry members to define and complete research projects with useful relatively near term results to encourage continued Industry interest and funding

Center for Metamaterials

David Crouse, Director

Michael Fiddy, Site Director UNCC

S.V. Babu, Site Director Clarkson University

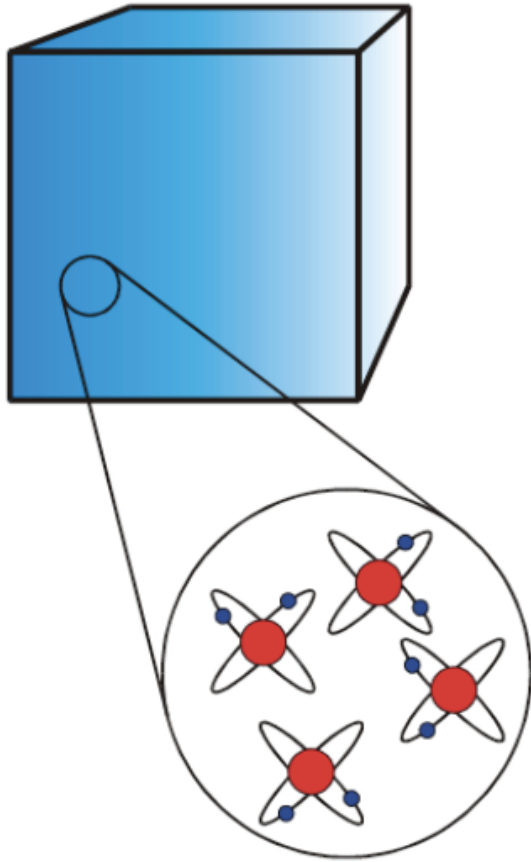
Center for Metamaterials Mission:

The Center for Metamaterials' mission is to provide a one-stop shop for the design, fabrication, and testing of a wide range of metamaterials for use in spectral regions ranging from the microwave to optical part of the electromagnetic spectrum.

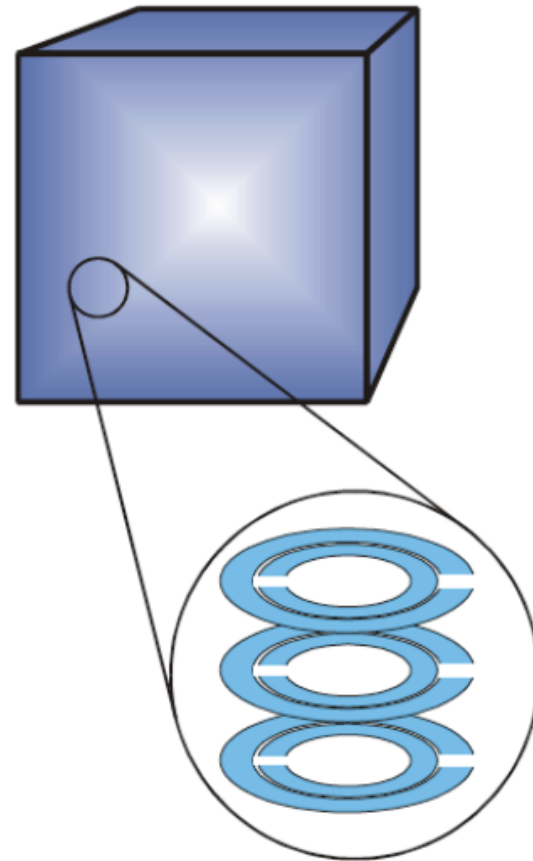


What is a ‘metamaterial’

Conventional materials: properties derive from their constituent *atoms*.



Metamaterials: properties derive from their constituent *units*. These units can be engineered as we please.





Raytheon





WHO WE ARE

- n A technology and innovation leader specializing in defense, homeland security and other government markets throughout the world
- n 2010 net sales: \$25 billion
- n 72,000 employees worldwide
- n Headquarters: Waltham, Massachusetts

» ***A global leader in technology and innovation***

Core Market: Sensing



Technologies that acquire data and create accurate, reliable information for effective battlespace decisions.

Sensing technologies provide precise situational data for effective battlespace decisions. They also advance our understanding of the physical environment on, above and beyond the earth.

Raytheon sensing solutions exploit the full electromagnetic spectrum, including electro-optical, radio frequency (RF), hyperspectral, acoustic, ultraviolet and radiological; spanning all domains: air, land, sea, space and cyberspace.

» *Meeting U.S. and International customer needs*

Strengths of I/UCRCs

- n Access to a diversified portfolio of research projects in advance of publication for relatively little funding
- n Opportunity for training of Industry partner engineers in emerging technology and tools
 - CfM project for improved electromagnetic modeling tools led to training of Industrial Partner engineers
- n Foundation for more competition sensitive collaboration between Industrial partners and Center universities
 - Joint proposals, consultancies, fabrication and testing of unique components and subsystems
- n Mutually beneficial recruiting opportunities for Industry partners and universities
 - Identify and recruit the top students and post-docs to Industry partners
 - Students can meet and get to know Industry partner companies

Opportunities for improvement

- n Establishing a track record of breakthrough products resulting from I/UCRC research to justify Industry member investment of precious research funds in a pre-competitive research center that includes competitors
 - This is a challenge for the CfM, because metamaterials research has not yet resulted in breakthrough products
- n Faster time to market for I/UCRC innovations: Industry needs are immediate and product managers and engineers operate in a highly charged environment where patience is not necessarily a virtue
- n Getting the attention of engineers and managers who can benefit from I/UCRC innovations
- n Funding university projects at the level required to achieve meaningful near term results
- n Broadening the scope of research in a new Center especially by building up the number of industrial members to fund more university projects