Metamaterials

Properties are more than the sum of their parts...

Glass with metal nanoparticles
Gothic rose window, Notre Dame

Air with wrought iron
Eiffel Tower
Metamaterials enable exotic optical and mechanical properties...

- Negative refraction
  - Dolling, Optics Express (2006)

- Negative mass density and bulk modulus

- Brunet, Science (2013)
Metamaterials

Designer materials for unique challenges

Scattering Control; ‘Cloaking’

Critical damping of vibrations

Single Molecule Spectroscopy

NuSTAR deployable mast

Pendry 2006 Science

Rodriguez-Lorenzo 2009 JACS
Metamaterials
New frontiers in infrared and mechanical materials

Julia Greer, California Institute of Technology
Materials by design
Christopher Spadaccini, Lawrence Livermore National Labs
Mechanical Metamaterials
Andrea Alu, University of Texas at Austin
Metamaterial-based device engineering
Alexandra Boltasseva, Purdue University
Catching light rays: refractory plasmonics applications

Jennifer Dionne, Stanford University
Luke Sweatlock, Northrop Grumman Aerospace Systems