Metamaterials: Next-Generation Aerospace Materials

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Abstract

Future spacecraft and human space exploration call for smaller, lighter, smarter and multifunctional aerospace materials. This extreme demand can be met with the discovery of artificially-created metamaterials whose properties depend primarily on structural design of the subwavelength building blocks, rather than its chemical constituents. In this talk, I will show how to engineer unprecedented optical and near-infrared material properties using carefully-designed lightweight and ultra-thin nanostructures. New metamaterial devices aimed to tackle aerospace problems concerning materials, security, energy, and space communications are highlighted, such as invisibility cloaks, micro-ring single-mode lasers, 2D monolayer lasers, efficient thermal emitters and multifunctional integrated optical elements.

Dr. Zi Jing Wong is a postdoctoral researcher at the University of California, Berkeley. Previously he graduated from UC Berkeley (Ph.D. in Mech. Eng.), KAIST (M.S. in Aerospace Eng., Best Thesis Award) and Universiti Teknologi Malaysia (B.Eng. in Aeronautics, Royal Education Award). He also did short-term research at both the University of Cambridge and Peking University. He has published in many prestigious journals such as Science, Nature Photonics, Nature Nanotechnology and Nature Communications with total citations exceeding 800. His work in metamaterials and micro/nanotechnologies has led to several awards from the professional societies such as MRS, IEEE, SPIE, OSA, IET and JSAP, as well as media coverage in CNN, BBC, Reuters and LA Times. He is also an International Master and the National Chess Champion of Malaysia.