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A new paradigm: Metamaterial and upconversion effects in natural materials**Michelle R Stem**

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This presentation will discuss the search, discovery, exploration and examination of the photonic control properties of natural, untreated opals having properties that were previously thought to exist only in artificially created materials. I will discuss the discovery of the first truly natural, untreated materials displaying: negative-index metamaterial, anti-Stokes upconversion, photonic glass, spontaneous laser emissions, and microspheroid cluster boundary effects. These materials display these photonic properties in visible light frequencies, with no toxic elements, in ambient conditions, and with significantly high energy conversion efficiency. Natural materials with such photonic control may be developed for broader applications in solar power, space exploration, energy production, stealth technologies, waveguides, microscopy, and photonic data storage/transmission.

Biography

Michelle R Stem has a PhD in Materials Science Engineering, MBA in Management and BS in Chemistry. She has done her Post-doctoral Research and continued work as a Senior Materials Researcher at Complete Consulting Services, LLC. She applies interdisciplinary expertise through multi-scale analysis, computational modeling, and laboratory synthesis to study extremely rare inorganic, complex, and semi-conductor (ICS) materials. She researches ICS structural and property variations to discover and ultimately engineer new methods, applications, models, materials, and metamaterials with the goal of controlling photonic, optoelectronic, band gap and other properties. In addition to this, she also does research to develop materials that save energy (e.g. power differentials for photonic band gap versus electronic materials) and finds alternatives to using up rare resources.

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