

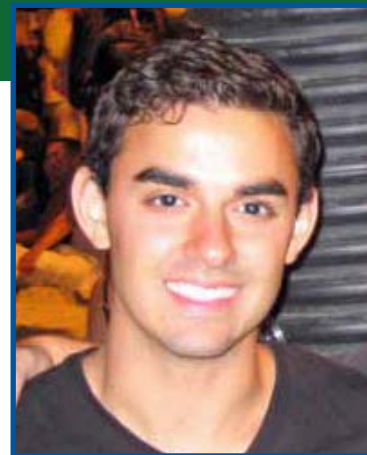
Carlos Andres Esteva

Graduate Institution: Stanford University

Graduate Discipline: Materials Science

Hometown: Plano, TX

Relevant SC Research: Basic Energy Sciences



Research Interest:

My research interests are in electromagnetic materials and their properties. In particular, I would like to expand on the properties of optical metamaterials and plasmonics and see their implementation in usable applications. Metamaterials are a class of artificial materials which exhibit tunable exotic properties, such as negative refractive indices. Their frequency-limited properties are a function of their nanostructure, and understanding the relationship between this structure and the electromagnetic bulk effective medium is a critical step in making metamaterials for specific applications. I am especially interested in helping to close this knowledge gap by mapping the relationship between nanostructure and bulk material properties. Surface plasmons are oscillating charges at air-material boundaries, and plasmonic materials can confine light to sub-wavelength scales using surface plasmons. My goal in graduate school is to help enhance our understanding of these materials to the point where we can incorporate them successfully into ultra-high efficiency (50-70%) solar cells.

About Me:

I graduated from the University of Texas at Austin, summa cum laude, with degrees in electrical engineering, specializing in electromagnetics, and pure mathematics, specializing in partial differential equations. I have conducted several years of undergraduate research in pre-cancer imaging, wireless communication

using visible light, and electromagnetic metamaterials. My undergraduate thesis was in the ab-initio structural design of metamaterial unit cells. I am a rising first-year graduate student in materials science at Stanford University, and I am interested in researching electromagnetic materials like plasmonics and metamaterials and using them in energy applications like solar cells. I graduated in December of 2011, and I have been working full and part time at Sandia National Laboratories since May 2011. My first Sandia project, during summer 2011, was in infrared metamaterial unit cell design. My current project, started in January 2012 and ongoing until July, is in fusion power. The Z machine at SNL uses huge power burst to generate inertial confinement fusion, and is used in extreme environments experiments (simulating environments such as the interior of a nuclear warhead as it detonates). Using genetic algorithms and transmission line models, I am optimizing the current pulses of the Z-machine for enhanced experimentation capability.

My career goals lie in high-level research leadership. I would greatly enjoy working towards the position of a national lab director, becoming a professor at a top-tier research opportunity, or taking a graduate school research project and forming a small company around it. I enjoy working with people as much as I enjoy independent research – I want to pursue a career that leverages both of these interests.

As a member of a variety of professional and academic associations, I have had the

pleasure of working with many talented individuals. I am a member and/or former officer for IEEE, Eta Kappa Nu (Elec. Engr. Honor society), Tau Beta Pi (Engr. Honor society), and Phi Beta Kappa (Science and Liberal Arts honor societies).

During my undergraduate years I was fortunate to receive a variety of scholastic scholarships, including several Presidential Endowed Scholarships in Engineering and Electrical Engineering. This culminated with the reception of the Outstanding Scholar-Leader Award – the highest honor bestowed upon a graduating senior by UT's Cockrell School of Engineering. My graduate awards include the Department of Energy's Office of Science Graduate Fellowship, the National Defense Science and Engineering Graduate Fellowship (declined), the National Science Foundation Graduate Research Fellowship (declined), the Whitaker Fellowship (declined), and the Stanford Graduate Fellowship.

I keep myself busy with a variety of hobbies. I am an avid salsa dancer, and have been performing and teaching for the past five years. I've trained martial arts for most of my life, focusing predominantly on Tae Kwon Do and WingChun Kung Fu. In addition, I trained in men's gymnastics for a few years, and had a great time competing with the UT Men's Gymnastics Club team. As a huge fan of the outdoors, I'm willing to try most outdoor sports, and greatly enjoy hiking, off-trail scrambling, camping, white-water kayaking, mountain biking, paragliding, and scuba diving.



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