

Alexander Giles, Ph.D.

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USA

About Me

Nanoscale Materials Ph.D. with applied physics background. My expertise lies in synthesis, fabrication and characterization of semiconductor nanomaterials. My current research interests include metamaterials and sub diffractive optics.

Publications: 30+

Citations: 1200+

h-index: 13

Education

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

Charlotte, North Carolina
Ph.D. Nanoscale Materials

CLARKSON UNIVERSITY

Potsdam, NY
B.Sc. Physics

Skills

ADVANCED NANOFABRICATION
electron microscopy, electron beam lithography,
tip based microscopy, dry and wet etching

MEASUREMENT AND CHARACTERIZATION
advanced spectroscopy and microscopy, XRD,
ellipsometry

SOFTWARE
Python, Java, R, C++, MATLAB, COMSOL

Experience

Research Physicist

The United States Naval Research Laboratory
Washington DC :: 2016 - Present

National Research Council Postdoctoral Fellow

The United States Naval Research Laboratory
Washington DC :: 2013 - 2016

Graduate Research Fellow

The University of North Carolina at Charlotte
Charlotte NC :: 2007 - 2013

Research Scientist

Parasol Technologies
Charlotte, NC :: 2010 - 2012

Graduate Research Fellow

US Naval Research Laboratory
Washington, DC :: 2009 (Summer)

Awards

2019 NRL Chemistry Division Award

For superior research and technical writing accomplishments
(2019)

2018 Innovation Award

Microscopy Society of America

For the development of isotopically engineered materials for
improved label-free nanoscale hyperlensing.
(2018)

Postdoctoral Research Publication Award

The National Academies of Science, Engineering and Medicine

For "Imaging of Anomalous Internal Reflections of Hyperbolic
Phonon-Polaritons in Hexagonal Boron Nitride."
(2017)

Postdoctoral Research Publication Award

The National Academies of Science, Engineering and Medicine

For "Aspect-Ratio Driven Evolution of High-Order Resonant
Modes and Near-Field Distributions in Localized Surface Phonon
Polariton Nanostructures."
(2016)

Postdoctoral Fellowship

The National Academies of Science, Engineering and Medicine
(2013)

EPIC Doctoral Student Fellowship

The University of North Carolina at Charlotte
(2011)

Global Venture Challenge Finalist

Oak Ridge National Laboratory
(2010)

Selected Publications

Exploiting Phonon-Resonant Near-Field Interaction for the Nanoscale Investigation of Extended Defects

B Hauer, CE Marvinney, M Lewin, NA Mahadik, JK Hite, N Bassim, AJ Giles, RE Stahlbush, JD Caldwell, T Taubner
Advanced Function Materials, 30 (10) 1907357 (2020).

Controlling the Infrared Dielectric Function Through Atomic-Scale Heterostructure

DC Ratchford, CJ Winta, I Chatzakis, CT Ellis, NC Passler, J Winterstein, P Dev, I Razdolski, JG Tischler, I Vurgaftman, MB Katz, N Nepal, MT Hardy, JA Hatchel, JC Idrobo, TL Reinecke, AJ Giles, DS Katzer, ND Bassim, RM Stroud, M Wolf, A Paarman, JD Caldwell. ACS Nano 13 (6), 6730-6741 (2019).

Hybrid Longitudinal-Transverse Phonon Polaritons

CR Gubbin, R Berte, MA Meeker, AJ Giles, CT Ellis, JG Tischler, VD Wheeler, JD Caldwell, S De Liberato.
Nature Communications 10 (1), 1-6 (2019).

Ultra low loss phonon polaritons in isotopically pure hexagonal boron nitride

AJ Giles, S Dai, I Vurgaftman, T Hoffman, S Liu, L Lindsay, CT Ellis, N Assefa, I Chatzakis, TL Reinecke, JG Tischler, MM Fogler, JH Edgar, DN Basov and JD Caldwell. Nature Materials 17, 134-139 (2018).

Active tuning of surface phonon polariton resonances via carrier photoinjection

AD Dunkelberger, CT Ellis, DC Ratchford, AJ Giles, M Kim, CS Kim, BT Spann, I Vurgaftman, JG Tischler, JP Long, OJ Glembocki, JC Owrutsky, JD Caldwell
Nature Photonics 12 (1), 50 (2018).

Sub-nanometer thin oxide film sensing with localized surface phonon polaritons

R Berte, CR Gubbin, VD Wheeler, AJ Giles, V Giannini, SA Maier, S De Liberato, JD Caldwell. ACS Photonics, 5 (7), 2807–2815 (2018).

Fabrication of phonon-based metamaterial structures using focused ion beam patterning

ND Bassim, AJ Giles, LE Ocola, JD Caldwell. Applied Physics Letters 112 (9), 091101 (2018)

Nanoscale mapping and spectroscopy of nonradiative hyperbolic modes in hexagonal boron nitride nanostructures

LV Brown, M Davanco, Z Sun, A Kretinin, Y Chen, JR Matson, I Vurgaftman, N Sharac, AJ Giles, MM Fogler, T Taniguchi, K Watanabe, KS Novoselov, SA Maier, A Centrone, JD Caldwell. Nano Letters 18 (3), 1628-1636 (2018).

Phonon-polaritonic bowtie nanoantennas: controlling infrared thermal radiation at the nanoscale

T Wang, P Li, DN Chigrin, AJ Giles, FZ Bezares, OJ Glembocki, JD Caldwell, T Taubner
ACS Photonics, 4, (7), 1753-1760 (2017)

Nanostructured Surface Phonon Polariton Systems for Mid-Infrared Nanophotonics

AJ Giles, R Kasica, JD Caldwell. JEOL News vol 51 (2016)

Aspect-ratio driven evolution of higher-order resonant modes and near-field distributions in localized surface phonon polariton nanostructures

CT Ellis, JG Tischler, OJ Glembocki, FJ Bezares, AJ Giles, R Kasica, L Shirey, JC Owrutsky, DN Chigrin and JD Caldwell.
Scientific Reports 6, 32959 (2016)

Imaging of anomalous internal reflections of hyperbolic phonon-polaritons in hexagonal boron nitride

AJ Giles, S Dai, OJ Glembocki, AV Kretinin, Z Sun, CT Ellis, JG Tischler, T Taniguchi, K Watanabe, MM Fogler, KS Novoselov, DN Basov, and JD Caldwell, Nano Letters, 16 (6), 3858-3865 (2016)

Role of epsilon-near-zero substrates in the optical response of plasmonic antennas

J Kim, A Dutta, GV Naik, AJ Giles, FJ Bezares, CT Ellis, JG Tischler, AM Mahmoud, H Caglayan, OJ Glembocki, AV Kildishev, JD Caldwell, A Boltasseva, and N Engheta, Optica 3 (3), 339-346 (2016)

Photoinduced tunability of the Reststrahlen band in 4H-SiC

BT Spann, R Compton, D Ratchford, JP Long, AD Dunkelberger, PB Klein, AJ Giles, JD Caldwell, and JC Owrutsky, Phys Rev B 93, 085205 (2016)

Sub-diffractive volume-confined polaritons in the natural hyperbolic material hexagonal boron nitride

JD Caldwell, AV Kretinin, Y Chen, V Giannini, MM Fogler, Y Francescato, CT Ellis, JG Tischler, CR Woods, AJ Giles, M Hong, K Watanabe, T Taniguchi, SA Maier, and KS Novoselov, Nature Communications 5 (2014)