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Texas Tech University,
Department of Physics and Astronomy

Dear Members of the Faculty Search Committee,

I am writing to apply for a tenure-track Assistant Professor position in experimental condensed matter physics in the Department of Physics and Astronomy at Texas Tech University, in response to the opening currently posted on the Jobs@TTU webpage. I am presently an Assistant Professor at the University of Texas Rio Grande Valley (UT-RGV) in the Department of Physics and Astronomy.

In previous appointments at Columbia University in the City of New York and the University of Maryland, College Park, I successfully carried out two research projects: (1) The development of ‘the integration of metasurfaces into photonic circuits’, where I proposed novel photonic device platforms with record-breaking small footprint and optimal performance over a broad wavelength range. (2) The characterization of ‘hot-electron bolometric photodetection in graphene’ revealed the lowest noise-equivalent power with intrinsic high speed among commercial infrared photodetectors. Due to these accomplishments, I received the 2018 Outstanding Young Researcher Award from the Association of Korean Physicists in America.

In the first two years of my appointment as an Assistant Professor at UT-RGV, I have established a new research program to search for a fundamental understanding of the near-field interaction between surface evanescent light and surface charge oscillations confined in gradient metasurfaces. The program focuses on three research projects: Tailoring surface waves of light by (1) reconfigurable optical and thermal metasurfaces, (2) time-reversal symmetry-breaking metasurfaces, and (3) metasurfaces imitating quantum many-body systems. The program benefits from developments in low-loss and high-performance plasmonic or photonic devices, spintronic devices, and flat optical devices working in the under-explored long-wavelength infrared. At TTU, I would like to strengthen this ongoing research program by forming collaborations both within the Department and across disciplines, especially in the NanoTech Center in the Electrical Engineering Department.

To fulfill my research goals I actively took initiative funding opportunities. In 2016 I received the University of Texas System STARs Award (\$300k) in addition to University start-up funding and a research enhancement seed grant. Using these research grants, I have established a unique research laboratory for infrared and terahertz spectroscopy, microscopy, and polarimetry at UT-RGV. Our major lab instrumentation includes a Fourier Transform Infrared Spectrometer with an infrared microscope, an ultrafast Ti:Sapphire laser system with terahertz time-domain spectroscopy, cryogen-free optical cryostat, and infrared photoelastic modulator. I am currently seeking funding from the National Science Foundation, the Department of Defense, NASA, and the Welch Foundation to support ongoing research activities and training of graduate and undergraduate students in my laboratory. At TTU I will seek joint proposal opportunities on top of my current grant-seeking efforts, by actively communicating with faculty members in the Department and in the NanoTech Center to search for common research interests and available resources.

As a physics educator, I have taught several different levels of physics courses at UT-RGV including both calculus and non-calculus-based University Physics, Optics, and graduate-level Solid State Physics, in various teaching environments, including conventional lectures, online classes, and ITV (Interactive Television) classes between two campuses. In addition, I have offered research training and mentoring to 4 graduate students through Ph.D./MS physics degree program, 4 undergraduate students through NSF-REU program, and 3 high school students through summer outreach programs. These experiences will prove to be a great asset to the Department of Physics and Astronomy at TTU.

I am enclosing my curriculum vitae, list of publications, statement of research interests and plans, teaching philosophy, and contact information for five references. Thank you for your consideration. I look forward to hearing from you soon.

Sincerely,



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