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Dear Members of the Search Committee:

I am pleased to write this letter to apply for the open position for Assistant Professor of Biomedical Engineering and the Vanderbilt Brain Institute with a focus in Neuroengineering. I am currently a postdoctoral fellow at Purdue University working between the research groups of Krishna Jayant and Scott Pluta. I am a physicist by education and engineer by training, and I am now prepared to independently pursue my own research program with the philosophy of creative engineering approaches for studying neural circuits.

Over the course of my training, I have worked with two major pioneers in the field of nano-neurotechnology. During my PhD with Jacob Robinson at Rice University, I developed nanoscale electrodes horizontally embedded in microfluidic channels for scalable electrophysiology in the microscopic roundworm *C. elegans*. These were the first recordings of body-wall muscles in intact *C. elegans*, and this approach led to our discovery of a fascinating microfluidic-induced sleep state. Following my PhD, I sought a position where I could apply my fabrication expertise to investigate fundamental questions regarding neural circuits. This pursuit led me to my current position at Purdue University. In Krishna Jayant's lab, I have developed a suite of thin-film, flexible, and transparent neural interfaces that we have used in combination with two-photon imaging, silicon probes, and pharmacology to discover traveling waves of dendritic activity near the cortical surface. Our interfaces are very similar to existing µECoG arrays; however, our work is some of the first to use these new technologies to better understand mechanisms of circuit computation. In addition, we have also solved a critical engineering challenge in the field of nano-neurotechnology and invented a reliable method to finally enable nano-electrode recordings *in vivo*. Our scalable nano-needle arrays allow for high-density, three-dimensional electrophysiological mapping in mammalian cortex. In collaboration with Scott Pluta's lab in the Department of Biological Sciences, we use our micro- and nano-electrode platforms to study active touch in behaving mice.

My combined expertise in nano/micro-fabrication, flexible neural interfaces, simultaneous electrical and optical techniques, and innovative methods for recording subcellular dynamics manifests in my proposed work as an independent investigator. My vision is to inform the next-generation of clinical neuroprosthetics by building customizable brain-machine interfaces that reveal the natural learning strategies of neural circuits. My research program will focus on *how the brain learns* in these neuroprosthetic contexts. By creating unique applications for the latest neurotechnologies, asking fundamental questions about neural computations, and aiming for long-term clinical applications, I will create a sustainable research program.

Why Vanderbilt? My research approach is highly collaborative and I see immense potential at VU to bridge neuroscience and neural engineering. I look forward to working across departments with VU's many strengths in nanoscience, neuroscience, bioimaging, biophotonics, prosthetics, addiction, and disease. Together as a team, I believe Vanderbilt BME and Brain Institute are poised to demonstrate how close collaborations between neuroengineering and neuroscience can catalyze discoveries across multiple subfields. Finally, Vanderbilt stands out as a university with a history of dedication to equity and mentorship. VU is putting in the effort to diversify its faculty base and prioritize faculty mentorship of trainees. These are some of my own core values, and I have dedicated time and effort to develop my mentorship philosophy and empower marginalized communities. Vanderbilt has scientific excellence, extensive resources, a collaborative nature, and genuine core values, and I firmly believe all of the components are there for my personal success.

I look forward to your consideration. In this application, you will find all of the necessary materials, including my CV, teaching statement, research statement, and three letters of recommendation.

Sincerely,

Daniel L. Gonzales