

**Environmental Engineering**

**and Earth Sciences**

**EEES Department Seminar**

**Development of an ACE2-based biosensor for point-of-need saliva detection of SARS-CoV-2**

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SARS-CoV-2 is a novel *Betacoronavirus* belonging to the *Coronaviridae* family that infects human cells through interaction with a transmembrane protein conserved among mammals: the Angiotensin-converting enzyme II (ACE2). The dynamics and specificity of the SARS-CoV-2: ACE2 interaction make ACE2 the leading candidate to develop a host membrane receptor biosensor. Due to the high transmission rate and fast mutation capacity of this zoonotic virus, affordable and widely deployable biosensor technologies are of utmost importance for effective pandemic preparedness and response to future coronavirus outbreaks. The laser-induced graphene (LIG) is a simple one-step, direct-write graphene electrode fabrication method that emerges as a label-free, ease-to-produce, and affordable alternative for biosensor production. Herein, we develop a capacitive hACE2 biosensor for intact SARS-CoV-2 detection in saliva. Laser-induced graphene (LIG) electrodes were modified with platinum nanoparticles. The quality control of LIG electrodes was performed using cyclic voltammetry. Truncated hACE2 was used as a biorecognition element and attached to the electrode surface by streptavidin-biotin coupling. Biolayer interferometry was used for qualitative interaction screening of hACE2 with UV-attenuated virions. Electrochemical Impedance Spectroscopy (EIS) was used for signal transduction. Truncated hACE2 binds SARS-CoV-2 wild type and its variants with greater avidity than human coronavirus (Common cold virus). The limit of detection (LoD) is estimated to be 2,960 copies ml-1. The detection process usually takes less than 30 minutes. The strength of these features makes the hACE2 biosensor a potentially affordable approach to screening SARS-CoV-2 in non-clinical settings with high demand for rapid testing (for example, schools, airports).

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**Dr. Geisianny Moreira** earned her Ph.D. in Microbial Biology from the University of Brasilia, Brazil in 2019. Her graduate research centered around the investigation of how anthropogenic changes on vegetation may to affect the soil microbiome. She has research expertise in Molecular Biology, Classical and Applied Microbiology, Biotechnology and Microbial Ecology. Her research interest is in understanding the interrelationships between microorganism-microorganism, microorganism-environment, microorganism-other living beings, and biomolecules interactions. As a postdoctoral researcher at EEES department, her research focuses on elucidating the interactions between the Spike protein and its biorecognition elements for the development of a low-cost biosensor multiplex platform for SARS-CoV-2 detection in saliva.

**2:30 PM**

**Friday, April 15, 2022**

**Brackett Hall 100**

**Also available online via Zoom:**

<https://clemson.zoom.us/j/5783910968>

***In-person attendance is mandatory for graduate students enrolled in EES 8610, EES 9610, and GEOL 8510.***

***You can join online via Zoom only if you have tested positive for COVID-19 and requested an absence or have obtained prior approval for another valid reason.***