



**Wolfson Department of Chemical Engineering Seminar**

**Monday, May 23<sup>rd</sup>, 2022 at 14:00**

**Room #6**

**Solid-liquid Triboelectrification Based Self Powered Sensing Platform  
for Urine Analysis**

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**MSc Seminar**

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Urine analysis has been widely used as a diagnostic tool, that can provide many useful health-related information. However, clinical urine analysis often requires one to physically present in the clinics, which is inconvenient and time-consuming. Dipstick test can serve an alternative solution, allowing simple and quick assessments. But it's unable to provide continuous measurements and accurate readouts. Other techniques such as electrochemical sensors require additional power supply (battery), which is bulky and demands regular replacement. To overcome these drawbacks, we propose a self-powered sensing platform that examines the sodium ion concentration and glucose concentration in the urine. The design of the sensor is based on the liquid solid triboelectric nanogenerator (TENG). Upon its contact with water, the fabricated TENG generates current in the order of several microampere and voltage in the order of 10 volts. Sodium ion selective membrane and glucose oxidase were drop casted onto the electrode of the TENG respectively so that the output of the TENG can be selective to our analyte of interest. Benefiting from solid-liquid triboelectrification, it allows the sensors to detect the analyte of interest without the need of extra power supply. And the sodium ion sensor exhibits a sensitivity of  $0.75 \left[ \frac{\mu\text{A}}{\text{mM}} \right]$ , with selectivity towards potassium, calcium and magnesium ions, glucose, and uric acid. The glucose sensor shows a sensitivity of  $1.02 \left[ \frac{\mu\text{A}}{\text{mg/dL}} \right]$  with selectivity towards the sodium, potassium, calcium and magnesium ions and uric acid.