

***Principle Investigator:***

Dr. Keagan Pokpas

-systems composed  
garnered tremendous interest in imaging, phototherma



associated with redox activity, lowering the charge-transfer resistance, and enhancing the sensitivity and selectivity of the developed device. Owing to the toxic chemicals, elevated temperatures, and high energy demand associated with their synthesis, green methods for metallic nanoparticle preparation have been investigated. Harnessing the expertise of Prof. Gary Baker in the field of green nanochemistry, the current research project is aimed at the development of Au/Ag Nanostars following a light-mediated synthesis route. The study builds on the collaborative work established between the Baker Group and SensorLab, UWC over the 5-year period.

Ms. Ricaarda McDonald, a Ph.D. candidate in Chemistry at the University of the Western Cape, travelled to the University of Missouri-Columbia from the 1<sup>st</sup> of February – the 28<sup>th</sup> of April 2022 for a 3-month research visit. She was housed in the Baker Research Group where she had access to all chemicals, laboratory consumables, and research instrumentation required for the study.

**Figure 1:** (a) Images of Ricaarda with the Baker research group and (b) in the laboratory at the University of Missouri-Columbia, Chemistry.

Under the supervision of Prof. Gary Baker and UM Ph.D. candidate, Asher Segal, Ms. McDonald received extensive hands-on training related to nanomaterials preparation and spectroscopic and microscopic characterization techniques. Initially, Ricaarda developed a comparative study on the effect of various reducing agents on the size and morphology of gold and silver nanoparticles. Thereafter, a light-mediated synthesis approach was investigated for the synthesis of bimetallic Au<sub>(core)</sub>-Ag<sub>(shell)</sub> NPsm

ratios, light sources, and exposure times on the physiochemical, structural, and electrochemical properties of the nanostars was investigated. Significant progress and training were conducted during the 3-month research visit. During her visit to UM, Ricaarda worked extensively on UV-Visible spectroscopy to study the influence of reaction parameters on the structure of the developed nanomaterials. This provided her with an in-depth understanding of the technique. The results were further confirmed by high-resolution transmission electron microscopy (HRTEM). Initial electrochemical studies were investigated along with Mr. Segal. The study was repeated, and further investigation and characterization were completed upon her return to the University of the Western Cape (UWC). Ms. McDonald successfully developed a green, light-driven approach for the coating of gold nanostars with silver to prepare the Au<sub>(core)</sub>-Ag<sub>(shell)</sub> nanostars

The three-month re