

# Essence Brice, Chemistry

---

**University:** Alabama A & M University

**Year in School:** Senior

**Hometown:** Jacksonville, FL

**Faculty Mentor:** Dr. Sheryl Tucker, Chemistry

**Funding Source:** Emerge Summer Internship and Graduate School Prep

## Attaching fluorescent reporters to self-assembling nanocapsules

*Essence Brice, Jena Whetstine, and Sheryl Tucker*

Many researchers are working on understanding self-assembling macromolecules, in order to imitate and understand nature, especially after recognizing how many complex proteins and viruses are self-aggregating. Recently, the Atwood Group has self-assembled a nanocapsule not only capable of carrying cargo in its interior space, but should also be stable in water. This large neutral discrete pseudo-spherical coordination capsule is assembled from six pyrogallol[4]arene ligands and 24 copper(II) metal ions. The potential applications of this new material to bioanalytical chemistry, such as drug delivery, are enormous. Therefore, the ability to locate the nanocapsule in materials such as cells becomes imperative. The attachment of fluorescent molecules to the capsule surface is one experimental approach to this problem. The intrinsic fluorescence would facilitate the tracking of the actual nanocapsule assembly through various media. The purpose of the research project was to screen potential fluorophores for their suitability for attachment to the metal-coordinated nanocapsule surface. Therefore, a chemical moiety representing the attachment site of the larger structure was utilized. More specifically, catechol in methanol was reacted with a series of cupric compounds, such as anhydrous copper (II) sulfate and water, in a 2:1 ratio, respectively. Those solutions that formed a crystalline capsule moiety were further purified and reacted with fluorophores, such as phenol blue and pyrene butyric acid, containing the chemical entities, such as alcohols, amines, and carboxylic acids that would potentially coordinate to the metal site. Additional crystals produced at this step were then characterized via typical solid-state spectroscopic techniques.