Hot Electron Chemistry on Bimetallic Plasmonic Nanoparticles

Bryn E. Merrill  
*Chapman University*, merri152@mail.chapman.edu

Bingjie Zhang  
*Chapman University*, binzhang@chapman.edu

Jerry LaRue  
*Chapman University*, larue@chapman.edu

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**Recommended Citation**

Merrill, Bryn E.; Zhang, Bingjie; and LaRue, Jerry, "Hot Electron Chemistry on Bimetallic Plasmonic Nanoparticles" (2020). *Student Scholar Symposium Abstracts and Posters*. 403.  
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Methods

18 nm AuNPs were synthesized using a citrate reduction of gold (III) chloride (HAuCl$_4$) and then analyzed via UV-Vis spectroscopy (figure 3) and SEM (figure 4).

The absorption peak at around 530 nm shows that the LSPR are in the ideal range to be excited by a 532 nm laser. The SEM images show that the NP diameter is close to the target 18 nm.

The RuAuNPs were synthesized using ruthenium chloride (RuCl$_3$) and the synthesized 18 nm AuNPs, then analyzed via SEM (figure 5) and EDS (figures 6A and 6B).

Conclusion

The SEM and EDS images of the 18 nm AuNPs and the RuAuNPs show that the synthesis procedures were accurate in producing the target diameter; however, the segregation of ruthenium and gold rather than a uniform layer show that shells around the AuNPs were not achieved. The RuAuNP synthesis was being tuned for better coverage, but experimentation stopped after going online. We hope to optimize the RuAuNP synthesis and begin testing reactivity via CO oxidation.

References