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**PLASMONIC PROPERTIES AND SENSING APPLICATIONS OF ALUMINUM
NANOANTENNAS**

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Plasmonics, the phenomena resulting from light interactions with nanoscale structures, is an active field for a wide variety of applications and has been used for centuries. By varying the plasmonic metal, size, and shape, the nanostructures can be tuned to interact with various wavelengths of light. Commonly used plasmonic materials are the noble metals gold and silver, however can be costly to fabricate. Aluminum is a cost-effective alternative to the noble metals. However, aluminum does present a challenge as it readily forms a native oxide layer, which can both protect structures and complicate fabrication. Here we fabricate aluminum nanocrescents using an inexpensive, scalable technique to investigate their utility as substrates for a variety of surface enhanced spectroscopies. We show that aluminum is an affordable alternative to gold and silver and performs at the same level as gold and silver at IR wavelengths, a region that aluminum is not typically used in. We also investigate the differences in line shapes of alkyl stretches between aluminum and gold substrates.

Aluminum also shows great promise in other applications due to its high tunability potential and functionality across a broad region of the spectrum of light. This allows for a wide variety of applications, such as refractive index sensing for biological macromolecules, various surface enhanced spectroscopies, photocatalysis, and photovoltaics.