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Launching low energy surface plasmons in purple gold (AuAl_2)
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Virginia Tech, Blacksburg, Virginia 24061, USA — The intermetallic compound
 AuAl_2 is sometimes known as “purple gold” due to its intense purple color. It was
long assumed this color originated from an interband absorption transition, but, as
has recently be pointed out [1], it is related to a surface plasmon resonance which
exists in this material at a lower energy than in any of the pure metals (including
Au, Ag, Cu, etc.). Thin films of purple gold can readily be prepared by layered
evaporation of Au and Al in the proper ratios, followed by annealing at moderately
elevated temperatures. Fabricating AuAl_2 films on the hypotenuse of high index
glass prisms, we have been able to launch surface plasmons in this material in the
Kretschmann configuration, from which we directly extract the dispersion relation of
surface plasmons, in good agreement with predictions from previous measurements
of its dielectric function. Surface plasmon sensing results using AuAl_2 will also
be presented. Finally, we will discuss the possible applications for purple gold in
nanoparticle form, where it has the property of being an excellent light absorber
across the entire visible spectrum.

[1] Keast, V.J., et al., Appl. Phys. Lett. 99, 111908 (2011).

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