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**Surface Plasmon Polariton Amplification at Telecommunication Frequencies.**[1] MURALIDHAR AMBATI, SUNGHYUN NAM, DENTCHO GENOV, ERICK ULIN-AVILA, XIANG ZHANG, UNIVERSITY OF CALIFORNIA, BERKELEY. TEAM — Active plasmonics describes the interaction between an active medium and surface plasmons, and it offers a foundation for fundamental studies and an opportunity to expand surface plasmon based applications. In order to overcome the challenges posed by surface plasmons - primarily the metal losses - recent studies have focused extensively on surface plasmon amplification; however, there has been very limited headway from the experimental front. We present an experimental evidence of the amplification of long range surface plasmon polaritons (SPPs) by stimulated emission at telecom frequencies. We design SPP waveguides - thin gold metal strips - embedded in a gain medium, erbium doped phosphate glass. We confirm SPP amplification by showing an increase in the propagation length of surface plasmons in both pulsed and continuous modes. We present the design, fabrication and measurements of the gold SPP waveguides in erbium doped glass. Such structures will be suitable as integrated coupling devices as well as for the study of plasmon-exciton interface in cavity quantum electrodynamics.

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