Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The applications of silver think films for the transparent conducting films applications. JUI-HUNG HSU, National Sun Yat-sen University — Two important issues for the transparent conducting films (TCFs) are optical transparency and electrical conductivity, which are self-contradiction. Metallic thin films are the first materials used as the TCFs, but now are replaced by the transparent conducting oxides with plasma oscillator frequency below the visible frequency. The fact that metals have high extinction coefficients indicates that metals should be not transparent until an extremely low thickness. Hence a general belief is that the transparency for the metal thin films is not good enough for the TCF applications. One example is silver, which has a complex refractive index of n = 0.044 + 3.61i at 550 nm, and results in a high bulk reflectivity (R = 0.987) and small penetration depth (12 nm). However, recently publications incorporate metal thin films into TCF structures demonstrate that the structures have high transparency as well high conductivity, which seems to contradict to the belief mentioned above. Here we present our results that the transparency for the silver metallic thin films can be much higher than expected. Considering the high electrical conductivity of the silver, a thin film incorporating silver thin films can have better performance among the TCFs.

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Date submitted: 18 Nov 2016 Electronic form version 1.4