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Titanium Nitride Nanoparticles as Plasmonic Materials MICHAEL BOERGERT, CHARLES BRUCE, MICHAEL GRANADO, HEINZ NAKOTTE, New Mexico State University — In recent years, nanoparticles of Titanium Nitride (TiN) have often been investigated as plasmonic materials for visible and near-infrared wavelengths. In these wavelengths, some TiN nanoparticles have been shown to have optical absorption efficiency to similar-sized particles of silver and gold. One reason for these interesting behaviors in TiN is the stoichiometric mismatch leaving conduction bands open. Using normal valence properties of Titanium and Nitrogen, the formula should be Ti_3N_4 . However, the actual empirical formula is TiN, or depending on preparation conditions, could be TiNX , with X varying from about 0.6 to 1.2. Possible applications due to these unusual properties include sunlight absorbers for more efficient solar power generation, as well as metamaterials and other optoelectronic devices. Our research group investigated the absorption efficiencies for varying size distributions and found that, for certain size distributions, high absorption efficiencies could be achieved.

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