Plasmonic performance of ultrathin transition metal nitride films

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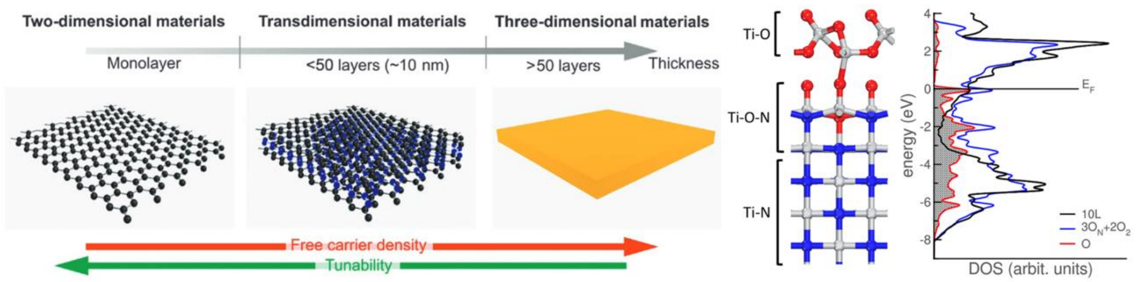
Transition metal nitrides (especially titanium nitride, TiN) have emerged as alternative plasmonic materials to traditional coinage metals (gold, silver) thanks to their refractory nature, low cost and compatibility with the semiconductor industry processes.[1–4] Recently, ultrathin (few nm thick) TiN films have raised interest because they exhibit intermediate properties between 3D and 2D materials.[5] These so-called "transdimensional materials" may offer unprecedented tunability of their plasmonic properties and enhanced non-linear effects.[6] In this regard, more studies are needed to fully understand their optical behavior and to unravel the potential applications of such materials.

The subject of the student work will consist of an experimental investigation of the plasmonic properties of ultrathin transition metal nitride films. The films will be deposited by atomic layer deposition (ALD)[7] and characterized from a morphological, structural, and chemical point of view. The so-obtained materials will be further investigated by optical spectroscopy techniques to assess their plasmonic performance, thus guiding further optimization by tuning the ALD synthesis parameters.



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