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Tailoring the Optical Properties of Sputter-Deposited Gold Nanostructures on Nanostructured Titanium Dioxide Templates

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Au/TiO₂ nanohybrid materials have attracted significant attention due to the outstanding optical, photocatalytic and photovoltaic performance. We use customized polymer templating to achieve TiO₂ nanostructures with different morphologies. Au/TiO₂ hybrid thin films are fabricated by sputter deposition. An in-depth understanding of the Au morphology on the TiO₂ templates is achieved with in situ GISAXS during the sputter deposition. The resulting Au nanostructure is largely influenced by the TiO₂ template morphology. Based on the detailed understanding of the Au growth process, characteristic distances can be selected to achieve tailored Au nanostructures at different Au loadings. For selected sputter-deposited Au/TiO₂ hybrid thin films, the optical response with a tailored localized surface plasmon resonance is demonstrated.

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