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Sweet Plasmonics: Sucrose Macrocrystals of Metal Nanoparticles PEDRO LUDWIG HERNANDEZ-MARTINEZ, Nanyang Technological University, Bilkent University, TALHA ERDEM, ZELIHA SORAN-ERDEM, Bilkent University, VIJAY KUMAR SHARMA, Nanyang Technological University, Bilkent University, HALIL AKCALI, IBRAHIM AKCALI, Bilkent University, NIKOLAI GAPONIK, ALEXANDER EYCHMÜLLER, TU Dresden, HILMI VOLKAN DEMIR, Nanyang Technological University, Bilkent University — We present a new plasmonic composite structure consisting of gold nanoparticles (Au NPs) incorporated into sucrose macrocrystals, preserving the plasmonic nature of the Au NPs. The resulting quantum efficiency (QE) in this composite material is enhanced via the interplay between the Au NPs and CdTe QDs from 24% to 38%. These results are in agreement with our model that includes electric field enhancement and Förster-type energy transfer. Energy transfer is observed by the shortening in the photoluminescence lifetime from 11.0 to 7.40 ns, upon the introduction of Au NPs into the QD incorporated macrocrystals. As a proof of concept, the fluorescence enhancement of green CdTe quantum dots (QDs) via plasmonic coupling with these Au NPs in the sucrose crystals is demonstrated. Thus, "sweet" plasmonic crystals are promising for large-scale robust platforms to embed metal nanoparticles.

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