

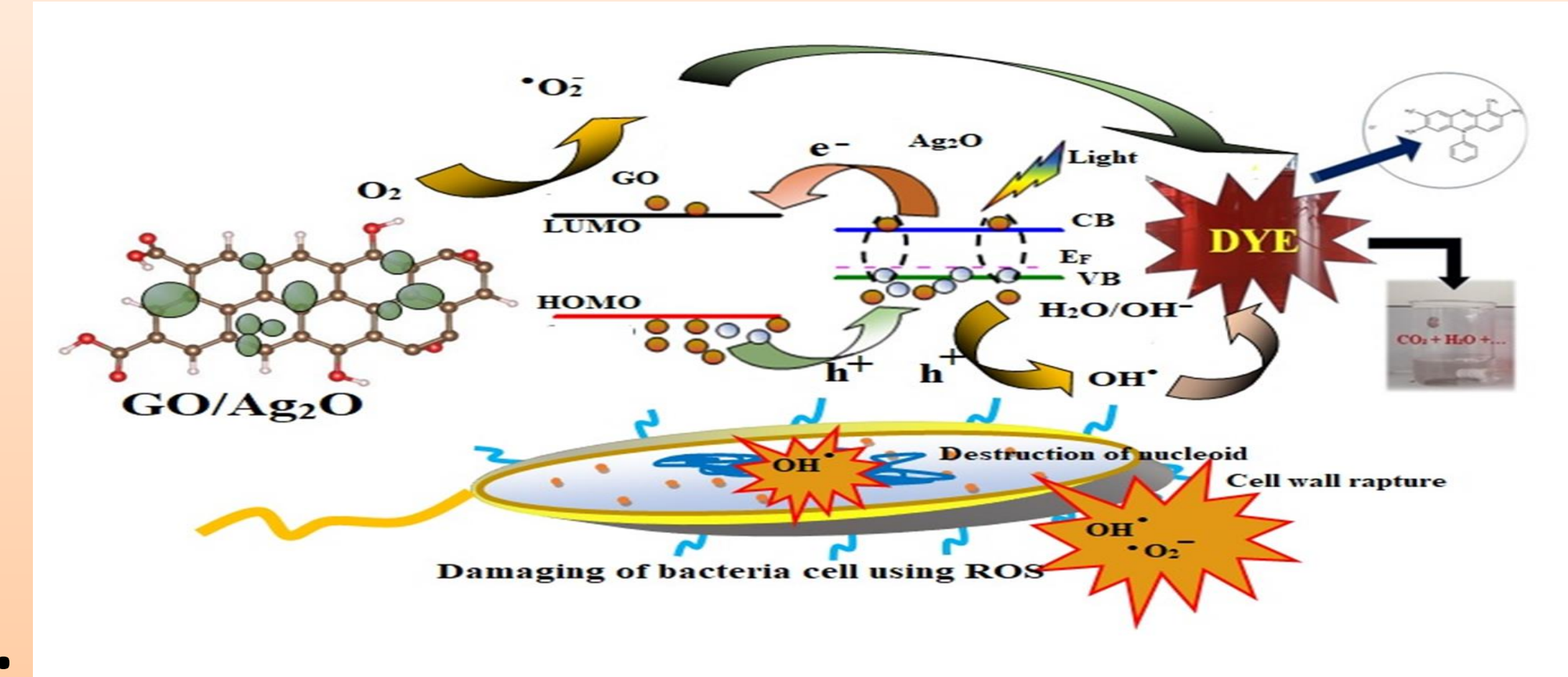
Room temperature synthesis of GO/Ag₂O nanocomposite: Broad spectral ranged solar photocatalyst and high efficacy antibiotic for waste water treatment

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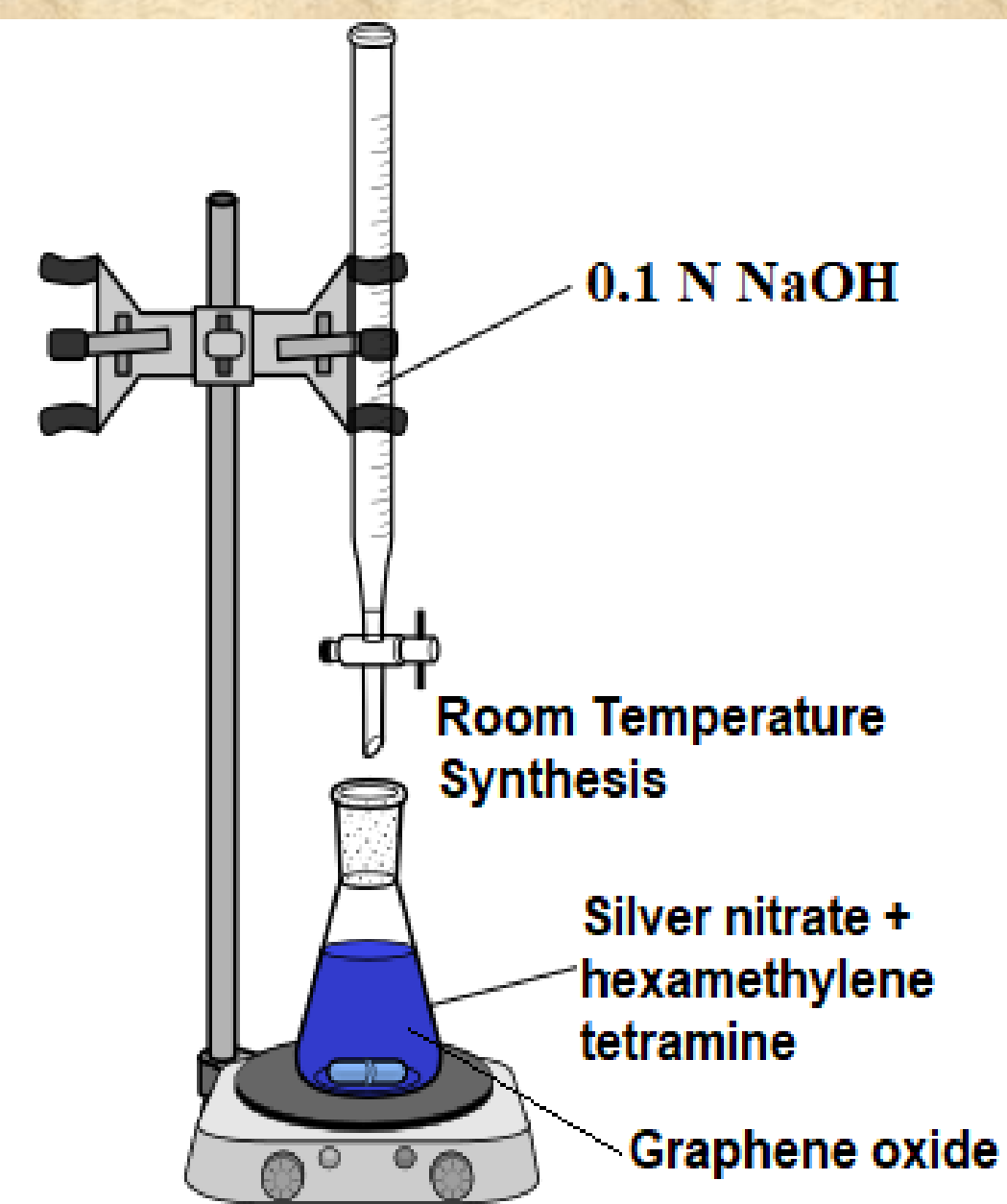
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- ❖ A room-temperature soft chemical route was employed to synthesis nanocomposite (Ag₂O nanoparticles/GO nanosheets).
- ❖ The surfactant HMTA is accountable for attaching the Ag₂O nanoparticles on GO surface in advance of nanowires formation.
- ❖ Various characteristics confirms that nanocomposite 10GO/Ag₂O (GO: AgNO₃ ~ 7.35) delivers best performance amidst other samples.
- ❖ The nanocomposite exhibited significantly broad photoresponse (200–1800 nm) and remarkably high photocatalytic and antimicrobial performances.
- ❖ Enhanced charge transfer between Ag₂O and GO in the nanocomposite resulted charge separation and consequently delivered improved photocatalytic performance.
- ❖ A novel approach was taken to obtain the electronic and optical properties of geometrically optimized structures of Ag₂O, GO and GO/Ag₂O using DFT analysis.
- ❖ MBC values viz. 0.05 mg/ml for Ag₂O and 0.01 mg/ml for 10GO/Ag₂O. The lower MBC of the nanocomposite is attributed to its improved ROS generation in comparison to Ag₂O and GO.
- ❖ Molecular docking studies established stronger interaction of GO unit in the nanocomposite with the bacterial proteins in comparison to bare GO which resulted in higher antibacterial activity of the nanocomposite against *E. coli*.
- ❖ Finally, our synthesized green catalyst demonstrating excellent photodegradation efficiency might improve the current problem of low-cost industrial waste water management. Same nanocomposite exhibiting very good antimicrobial performance also fulfils the demand to control the pathogenic waste in water bodies.

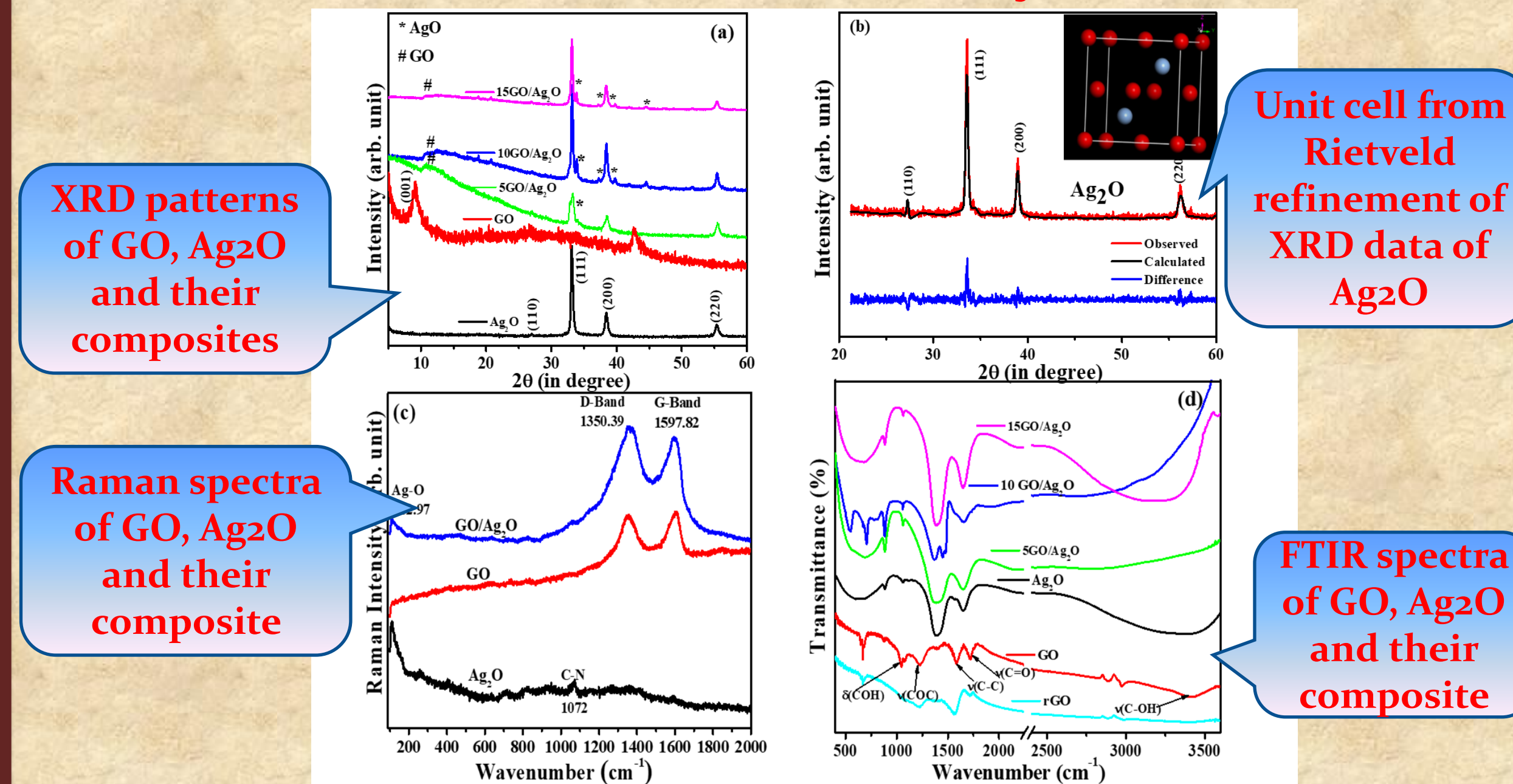


Synthesis of GO/Ag₂O nanocomposite

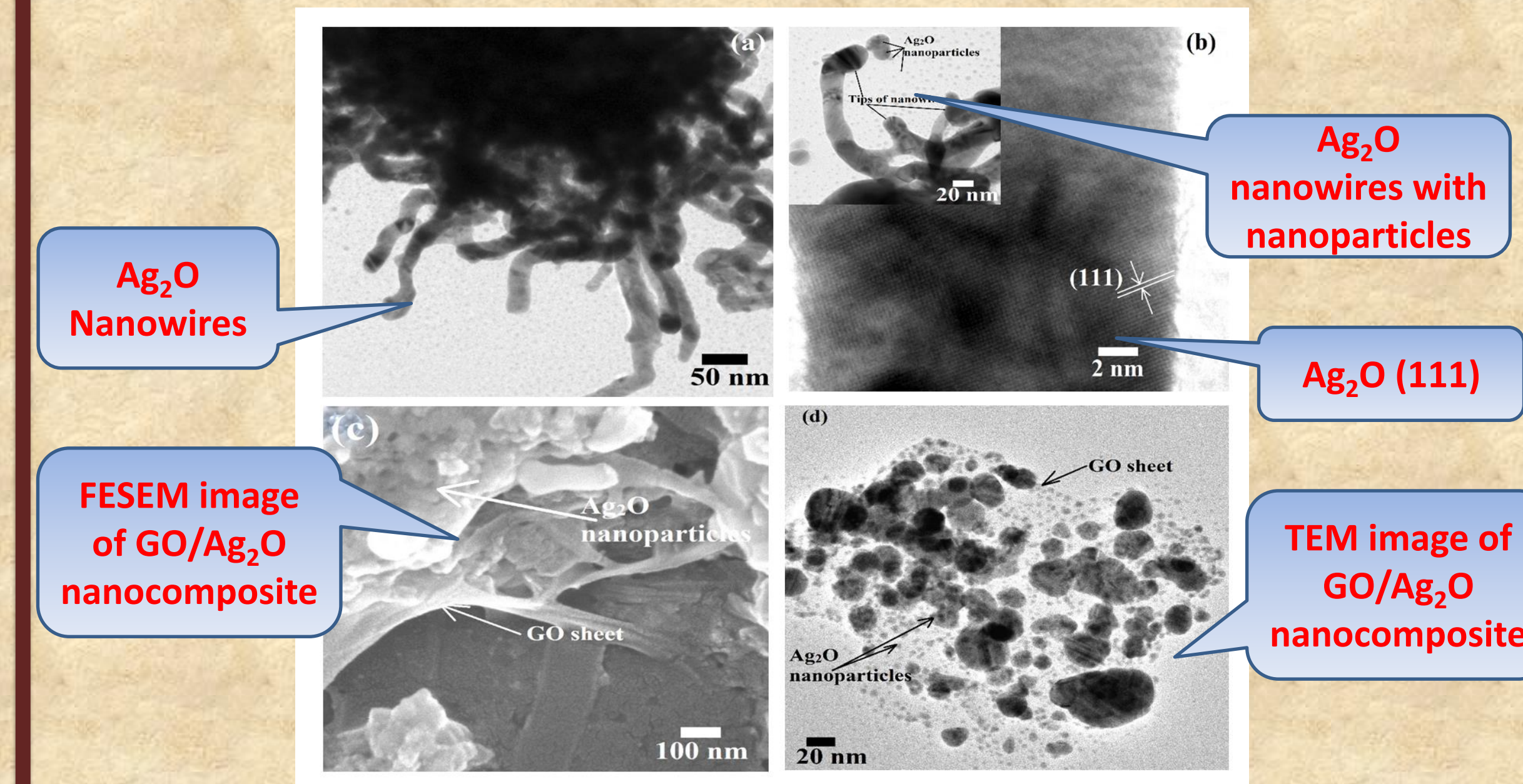


- Synthesis of Ag₂O nanowires at room temperature:
 $\text{AgNO}_3 + \text{HMTA} + \text{NaOH} \rightarrow \text{Ag}_2\text{O}$
- Synthesis of graphene oxide (GO):
Modified Hummers method.
- Synthesis of GO/Ag₂O nanocomposite:
Same method of synthesizing Ag₂O was followed for the preparation of 5GO/Ag₂O, 10GO/Ag₂O and 15GO/Ag₂O with different weight ratios of GO: AgNO₃ ~ 3.67, 7.35 and 11 respectively in reaction solution keeping all other experimental parameters constant.

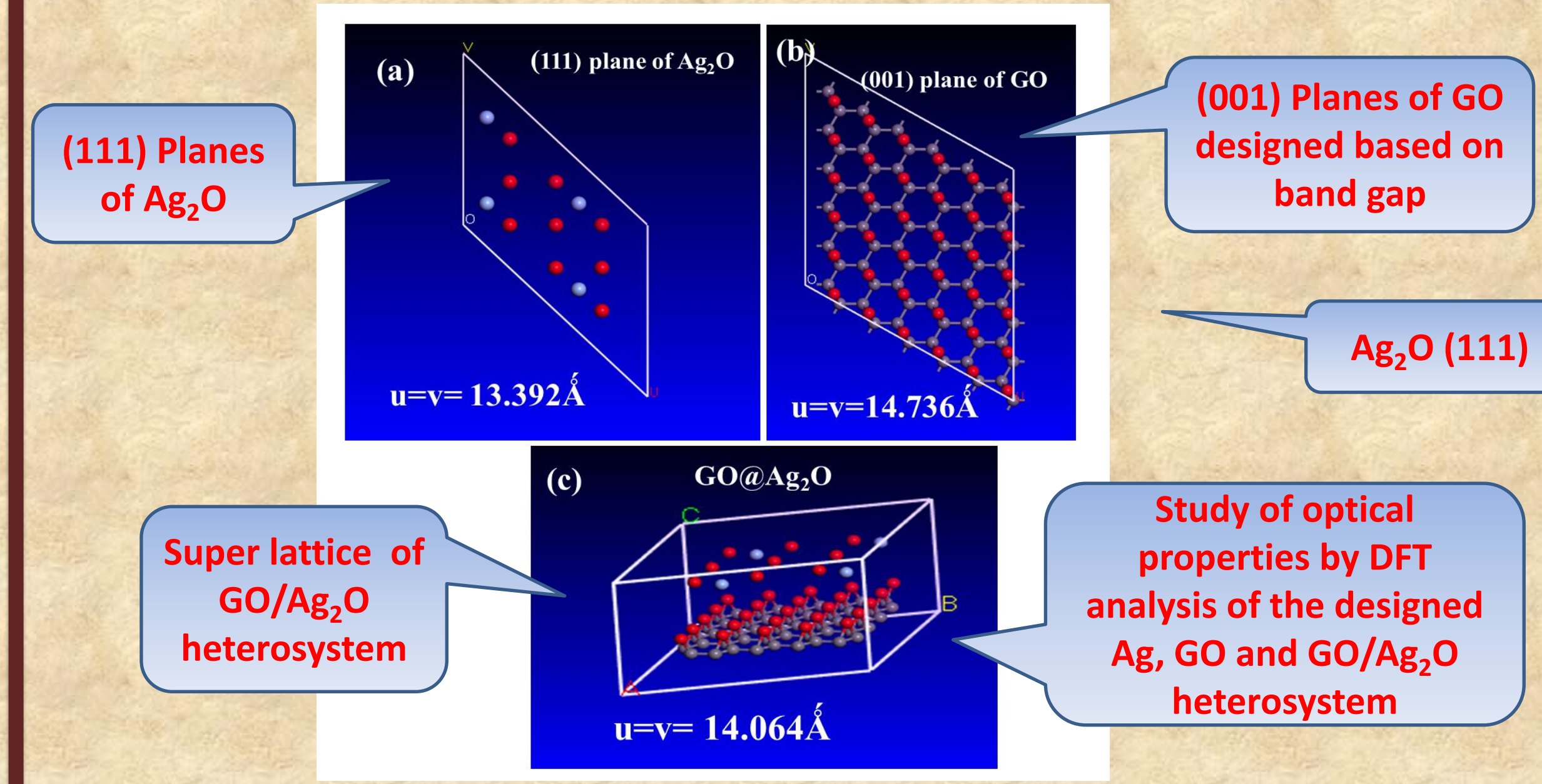
Microstructural Analysis



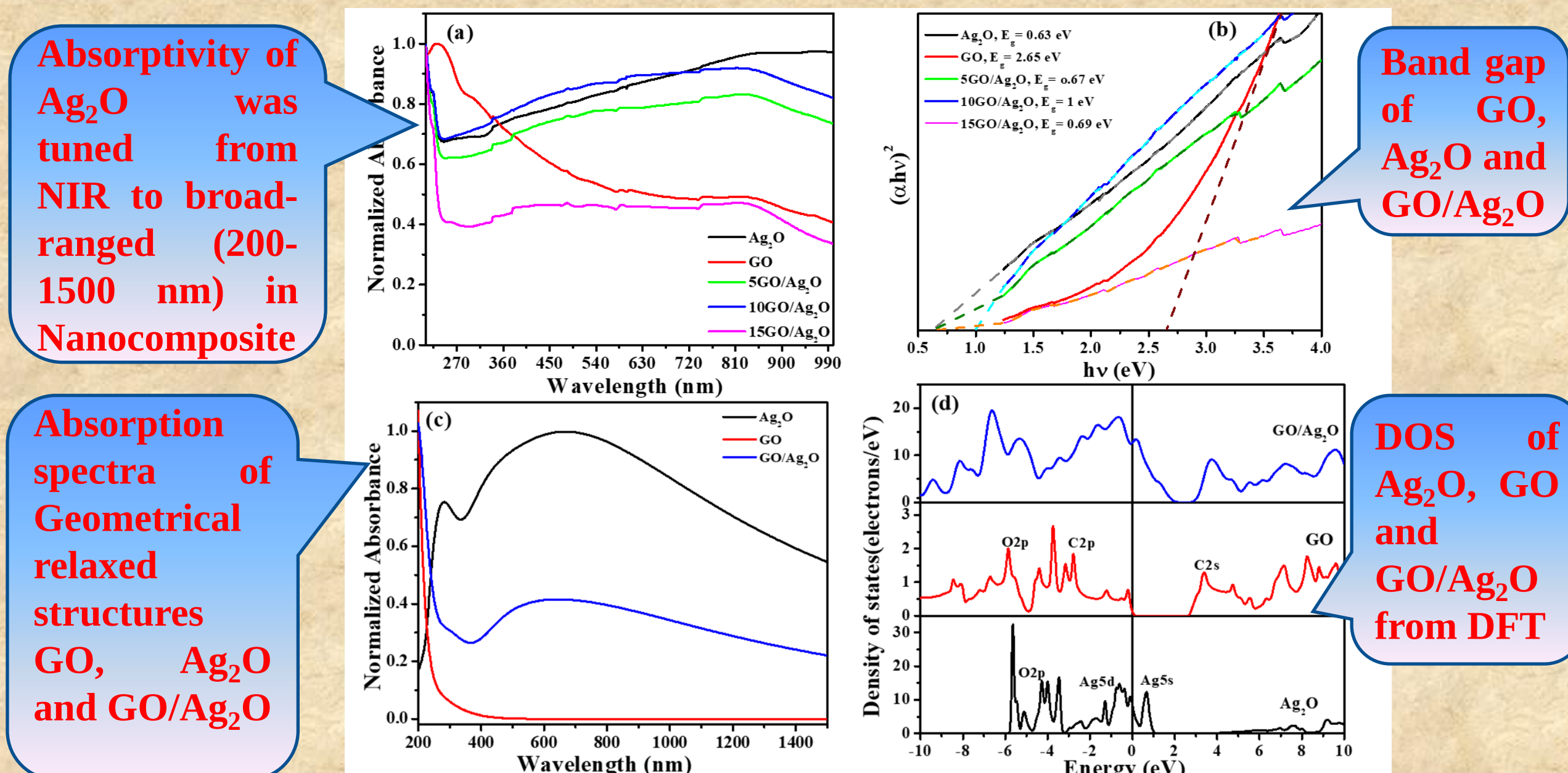
Morphological Studies



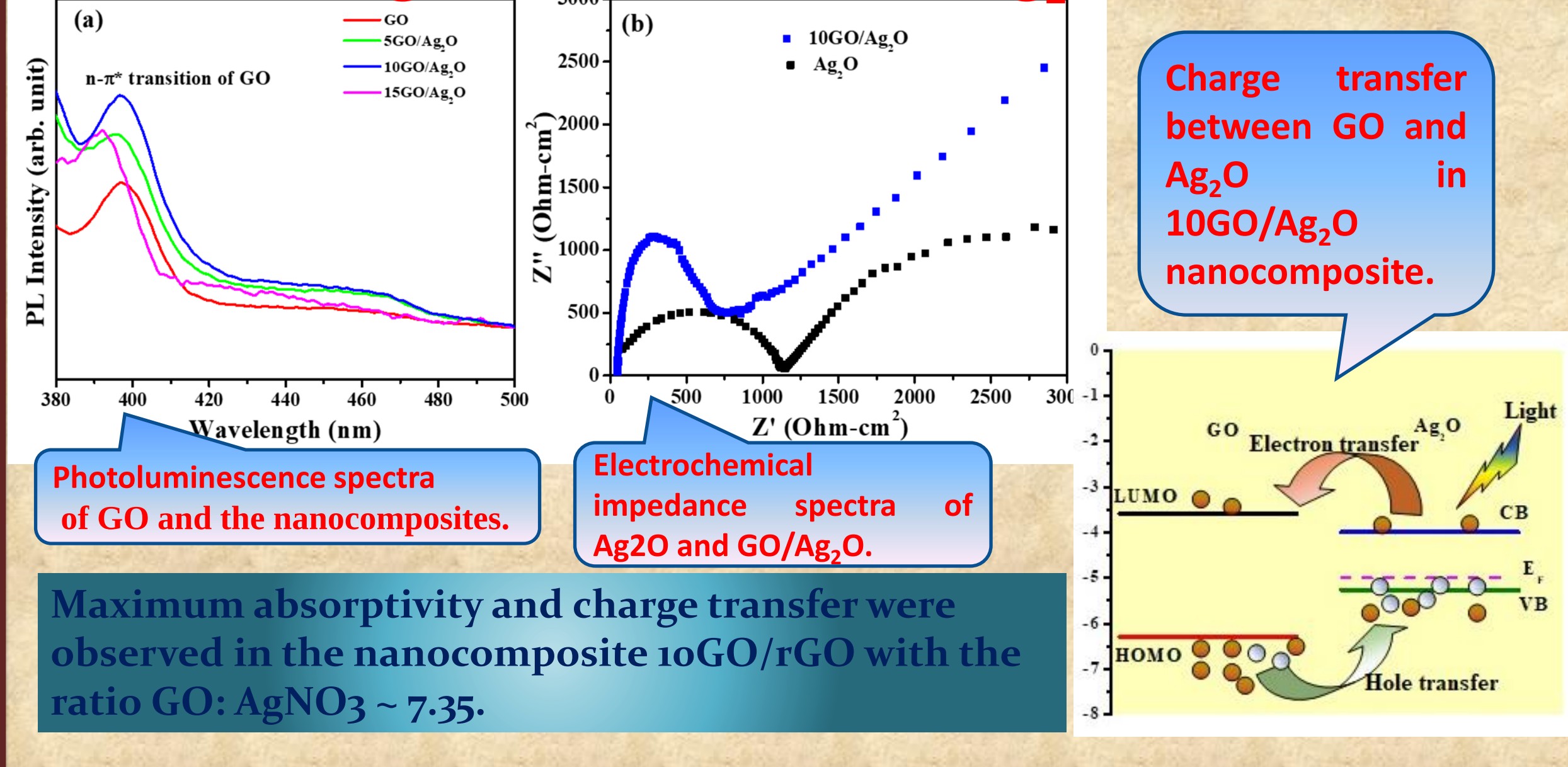
Design of GO-Ag₂O Heterosystem for DFT analysis



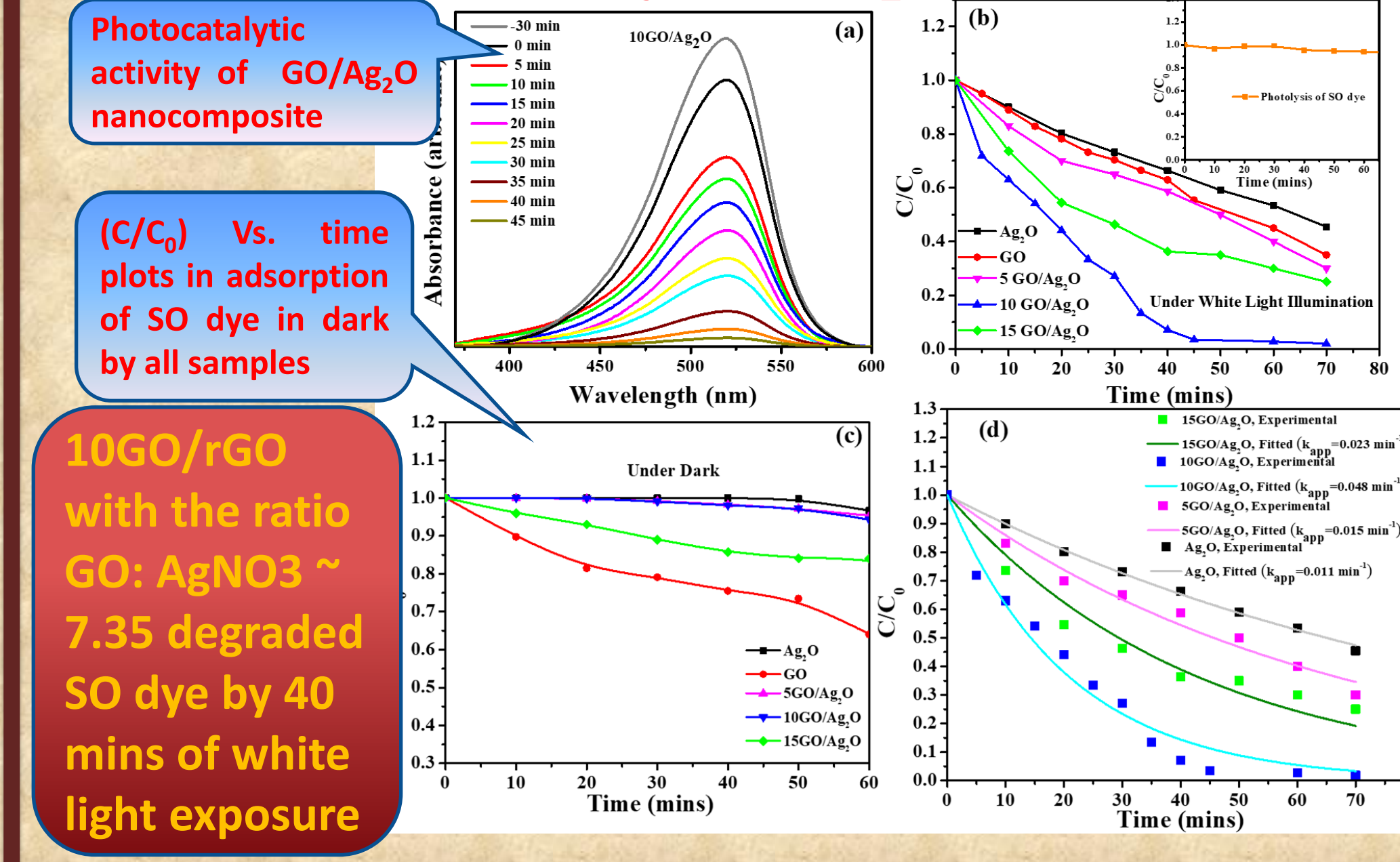
Optical Study



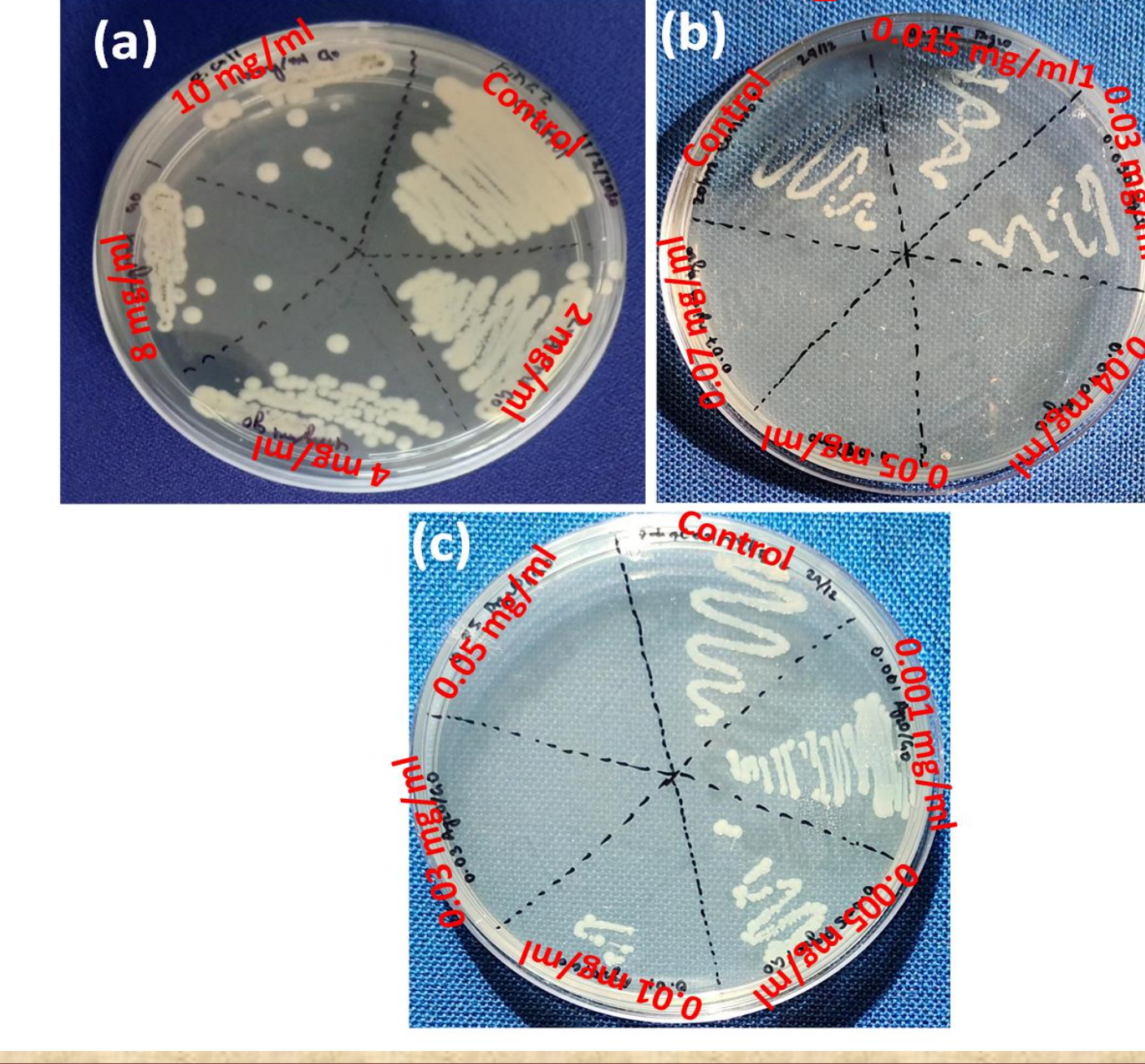
Charge transfer between Ag₂O and GO



Photocatalytic Properties



Antimicrobial Properties



Journal of Environmental Chemical Engineering
10 (2022) 107175.
Impact Factor: 7.968

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