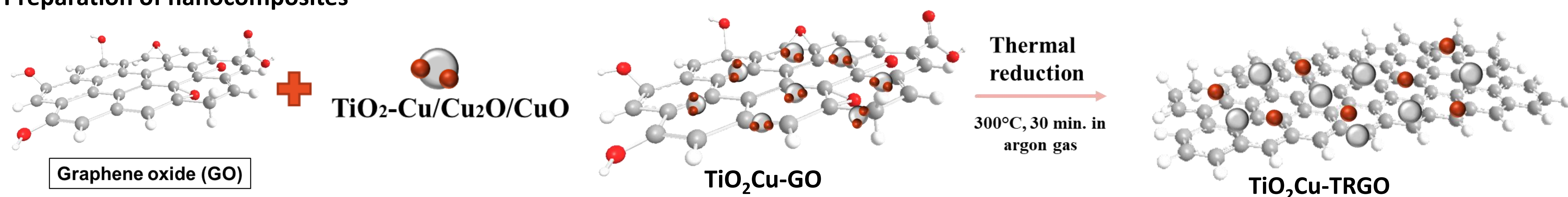


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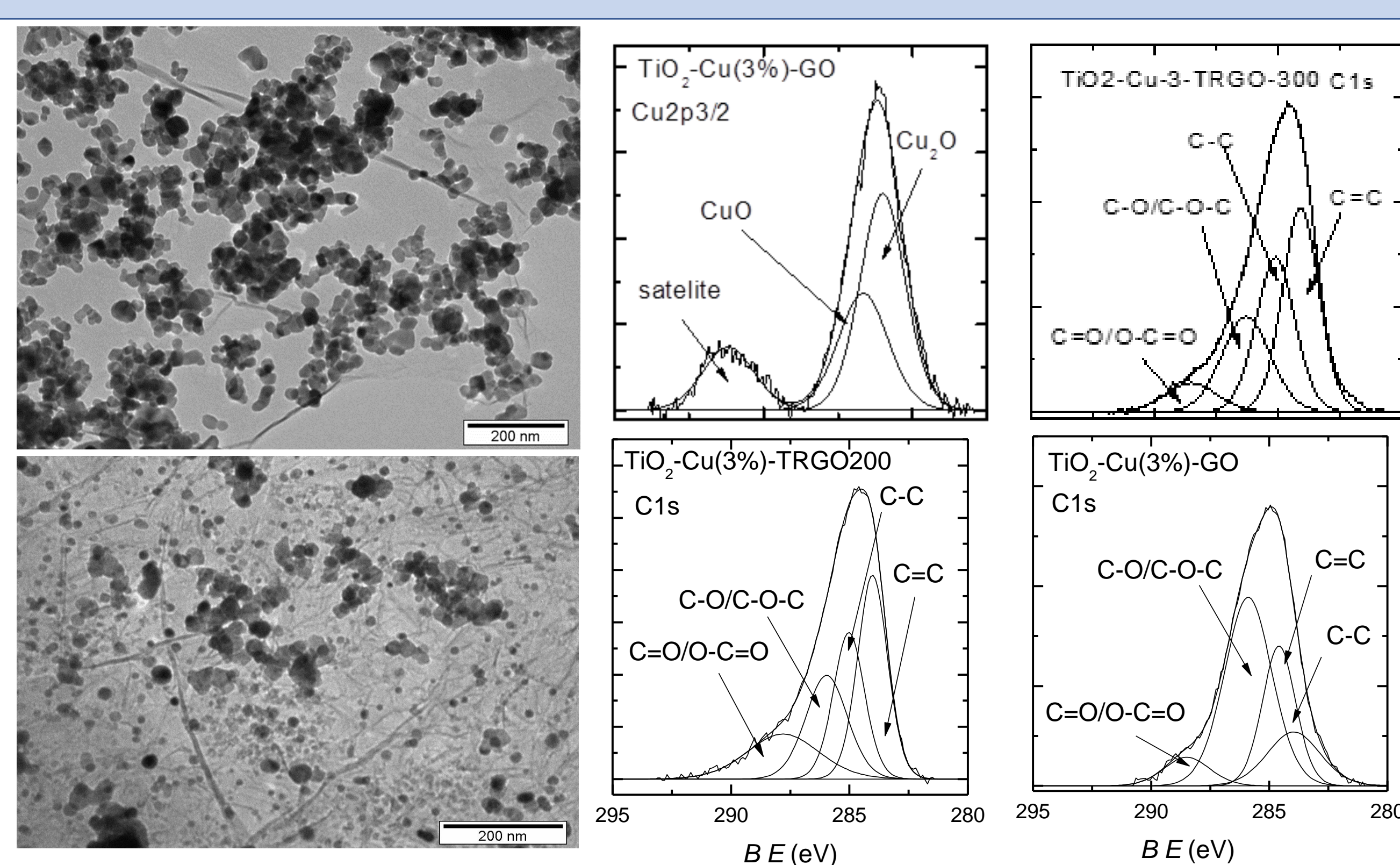
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**Abstract.** A series of copper oxides-titanium dioxide-reduced graphene oxide (CuO/Cu<sub>2</sub>O/rGO) composites were prepared via a simple procedure starting from copper nitrate, TiO<sub>2</sub> nanoparticles and graphene oxide. These composites possess different copper ratio (1, 2 or 3 %) and different reduction degrees for graphene, and were completely characterized in terms of morphology and spectroscopical aspects. Their physico-chemical properties (powder X-ray diffraction, XPS spectroscopy, diffuse reflectance UV-Vis), the oxidation degree of the copper atoms and reduction degree of the graphene were correlated with their photocatalytic activity by measuring the rate of methylene blue (MB) degradation under UV and visible light. MB was selected because of its strong adsorption to metal oxide surfaces, well defined optical absorption and good resistance to light degradation. In our experiments, MB proved less stable to light exposure and our conclusions were influenced by the photolysis of MB.

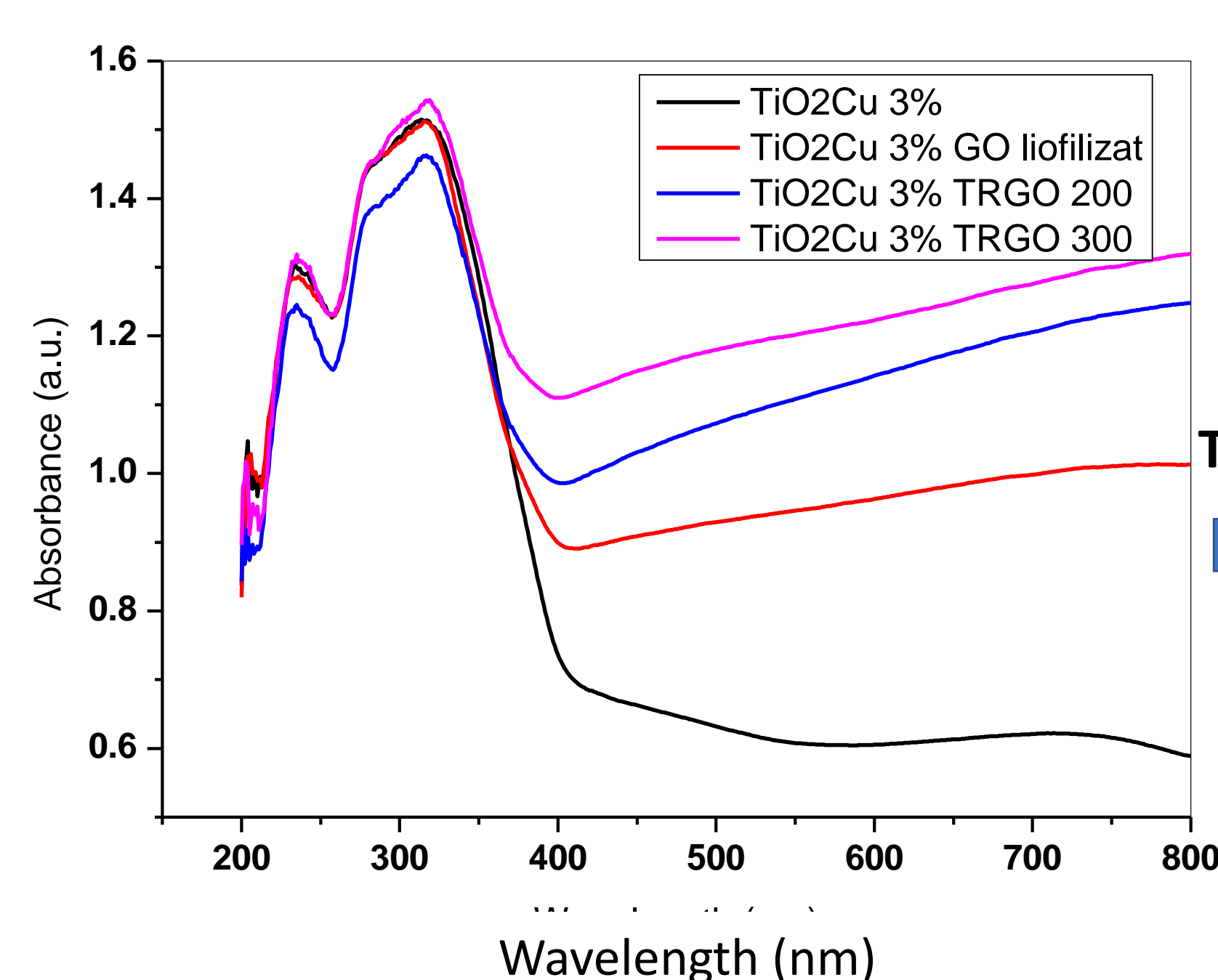
## Preparation of nanocomposites



## Structural and morphological aspects

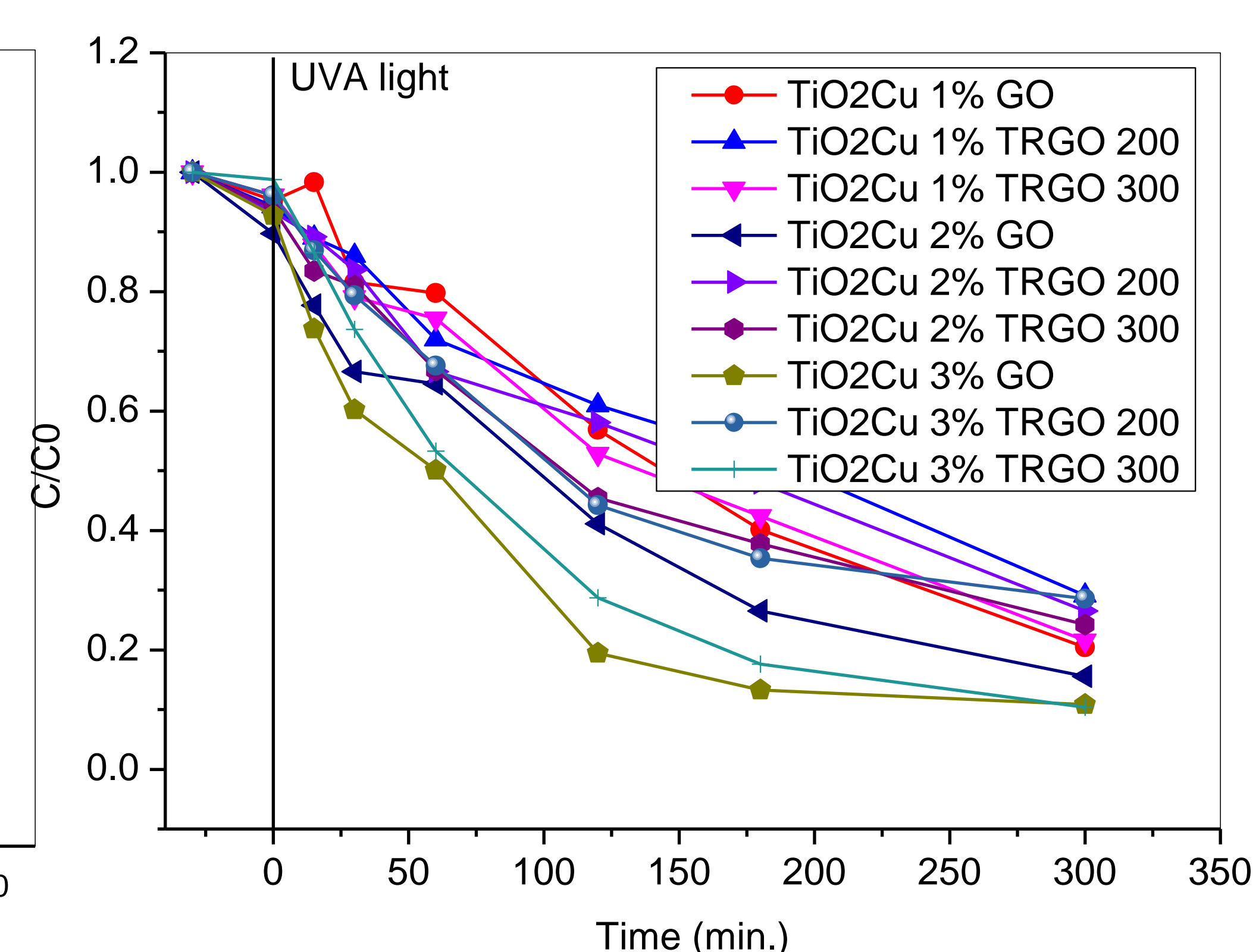
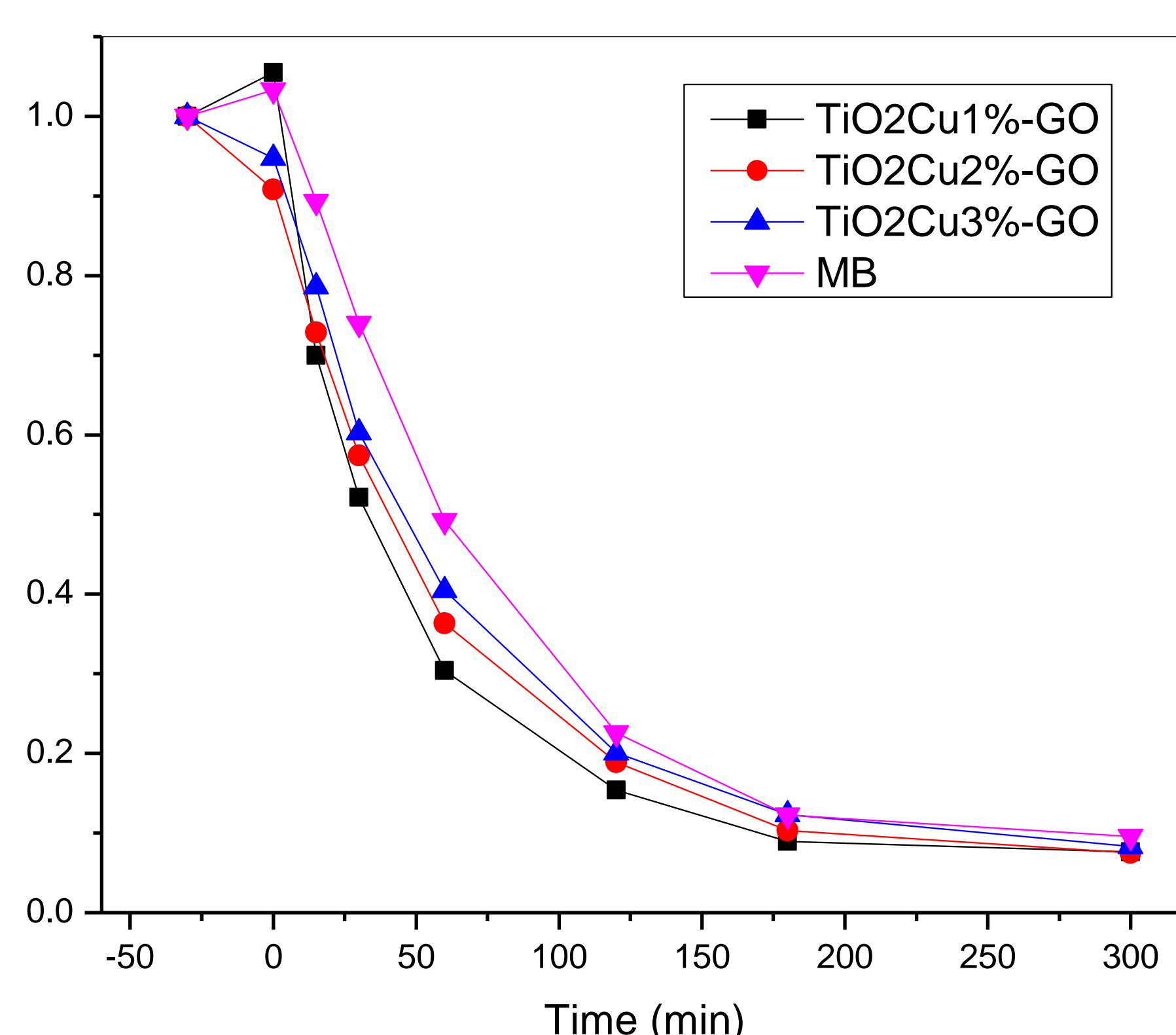
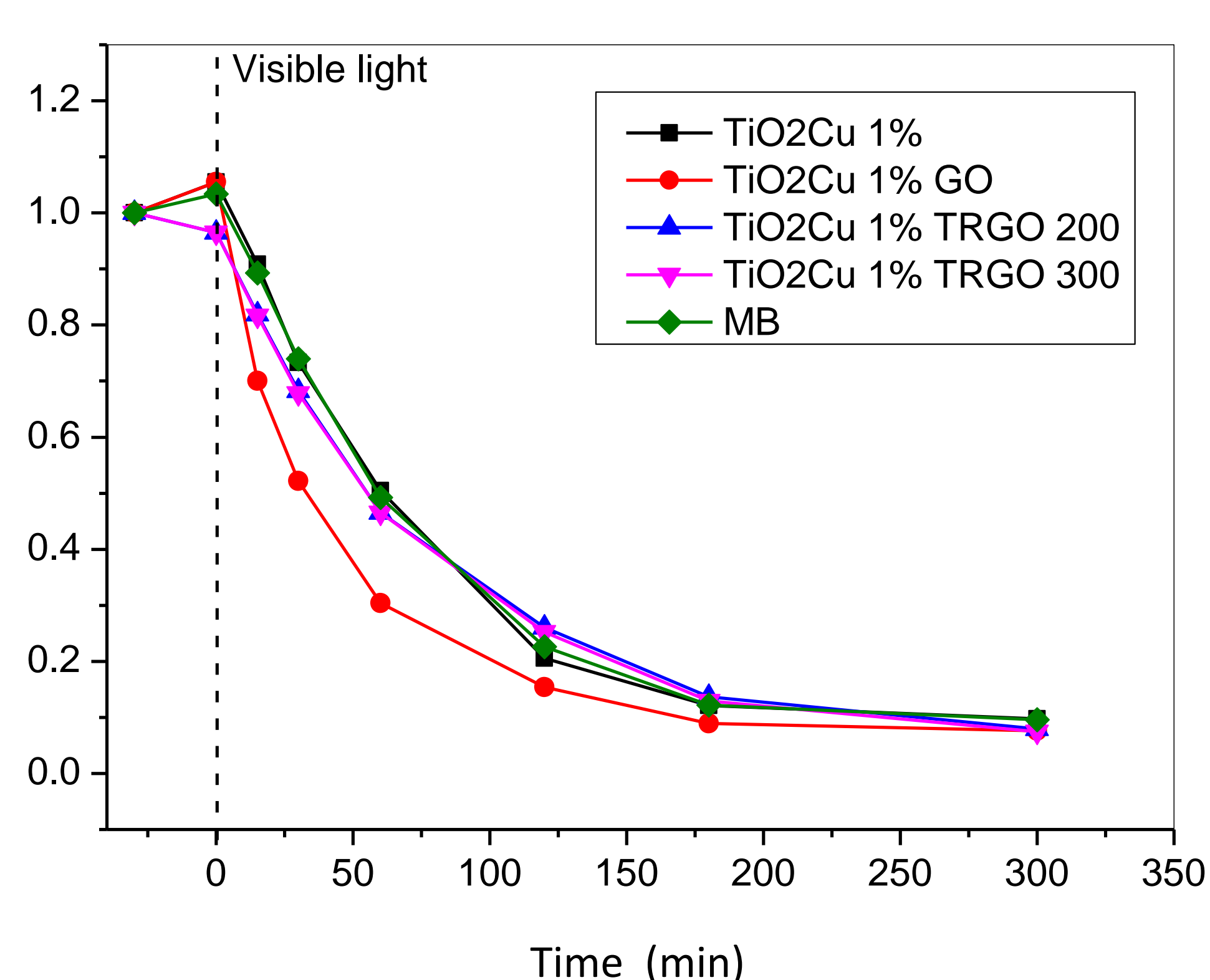
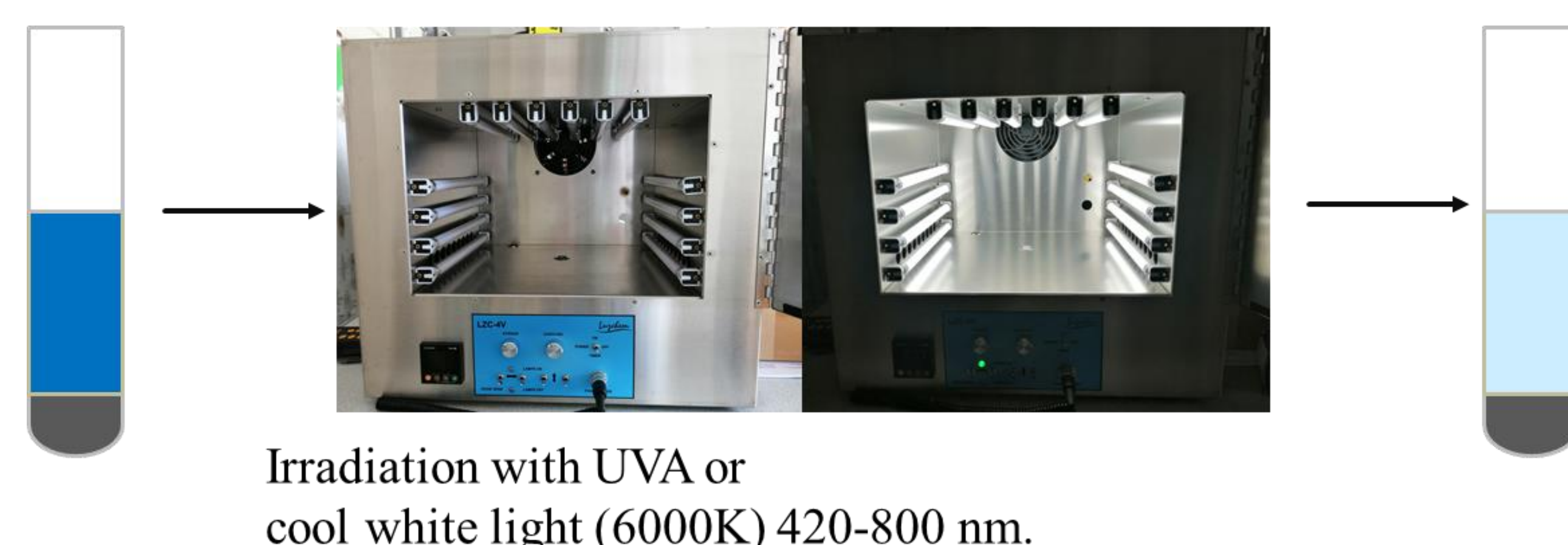


## UV-Vis analysis



Sample	Band Gap
TiO <sub>2</sub> Cu 1%	2.87
TiO <sub>2</sub> Cu 1% GO	2.60
TiO <sub>2</sub> Cu 1% TRGO 200	2.71
TiO <sub>2</sub> Cu 1% TRGO 300	2.54
TiO <sub>2</sub> Cu 2%	2.80
TiO <sub>2</sub> Cu 2% GO	2.60
TiO <sub>2</sub> Cu 2% TRGO 200	2.55
TiO <sub>2</sub> Cu 2% TRGO 300	2.46
TiO <sub>2</sub> Cu 3%	2.69
TiO <sub>2</sub> Cu 3% GO	2.54
TiO <sub>2</sub> Cu 3% TRGO 200	2.84
TiO <sub>2</sub> Cu 3% TRGO 300	2.77

**Photocatalytic experiments.** Methylene blue solutions of different concentrations and containing different concentrations of the photocatalyst were exposed to UVA or visible light and quantified after measuring the UV-Vis spectrum of the resulted solutions.



## Conclusions

- We have prepared efficient photocatalysts starting from TiO<sub>2</sub> nanoparticles decorated with copper nanoparticles and graphene with different oxidation rates
- The reduction degree of copper nanoparticles has been evaluated by XPS spectroscopy
- The evaluation of graphene role of the photocatalytic properties of TiO<sub>2</sub>/Cu-CuO-Cu<sub>2</sub>O composites was performed using methylene blue as model compound
- The obtained results show that the presence of graphene oxide improves the dynamic of the degradation process

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