Electronic Supplementary Material (ESI) for RSC Advances.

Coatings of magnetic composites of iron oxide and carbon nitride for photocatalytic water purification

– Supporting Information –

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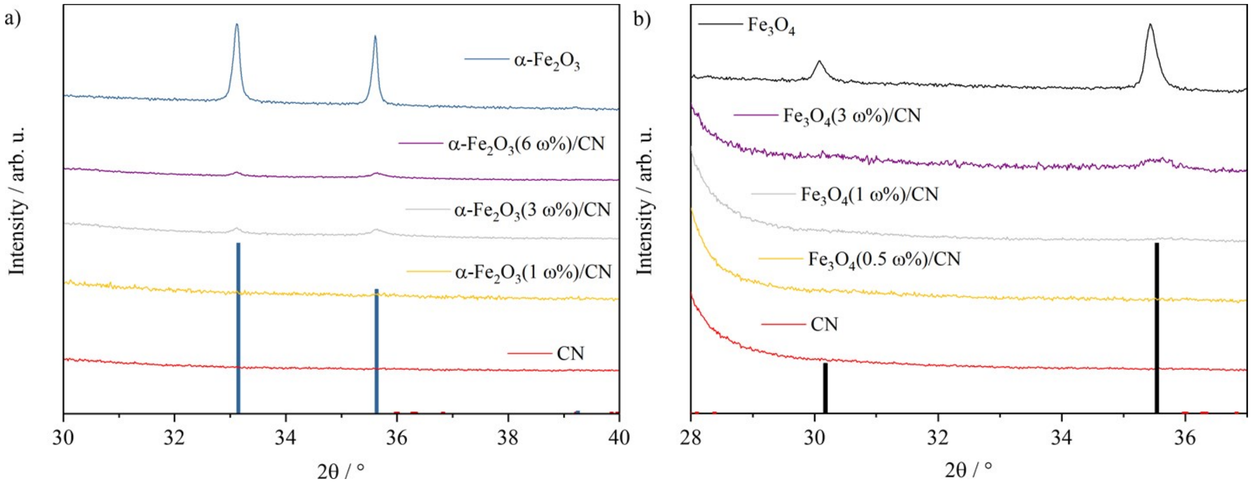
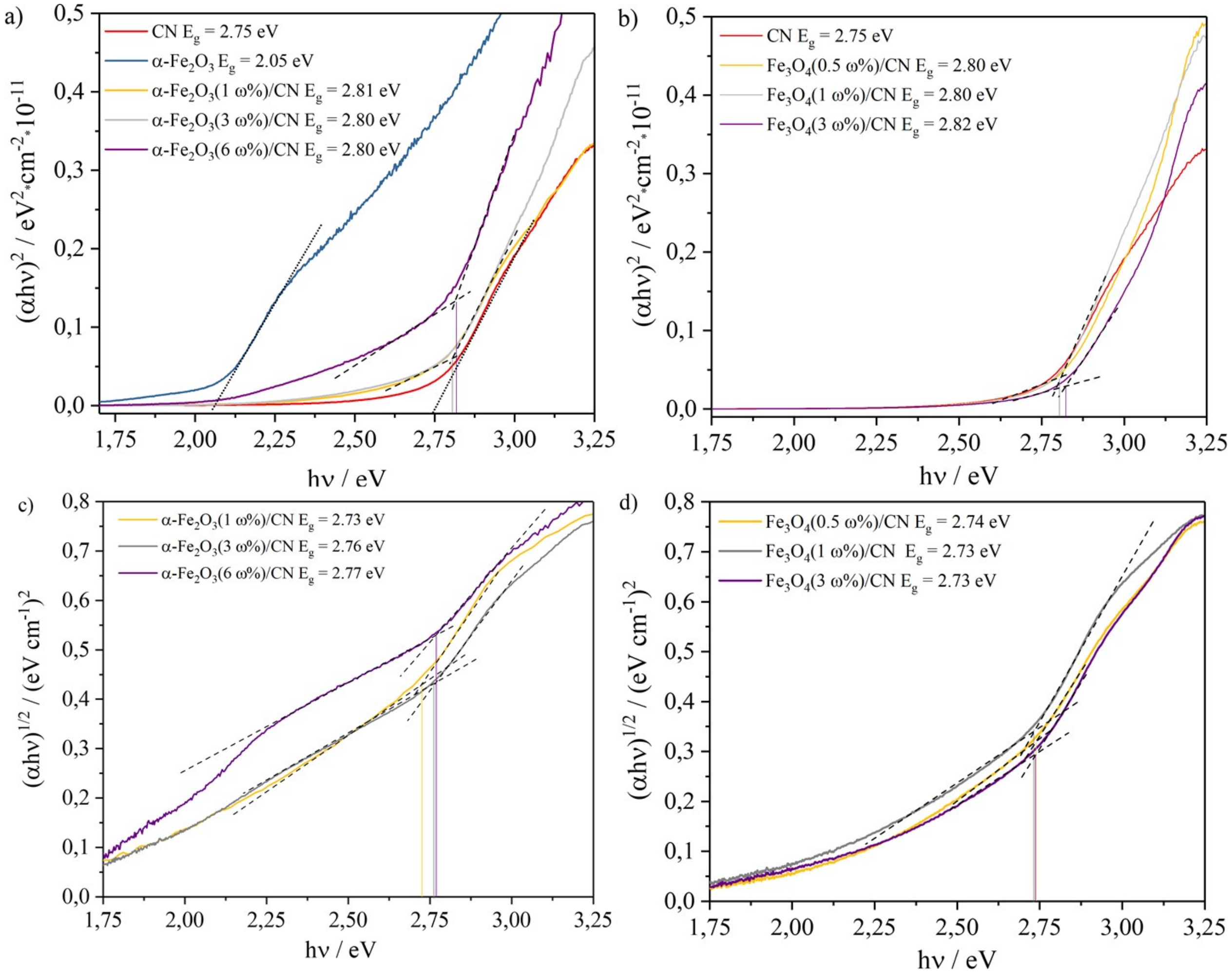
Table of Content

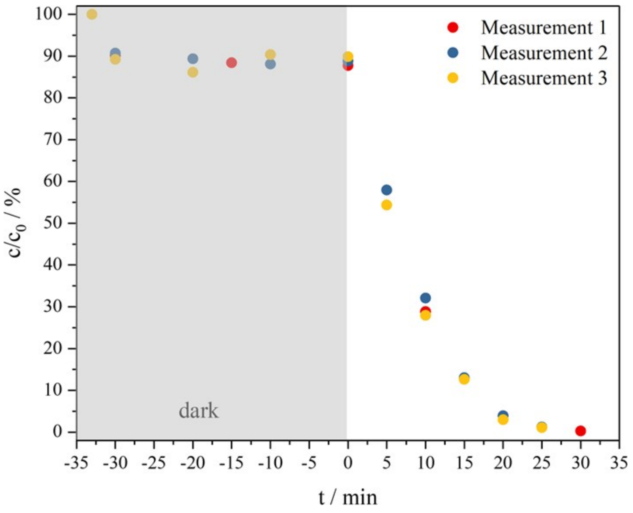


SI 1: Selected areas of PXRD patterns of the as-prepared catalysts a) α-Fe_2O_3/CN composites, α-Fe_2O_3 and b) Fe_3O_4/CN composites and Fe_3O_4, (references: α-Fe_2O_3 ICDD 01-089-059, blue bars; Fe_3O_4 ICDD 00-019-0629, black bars).

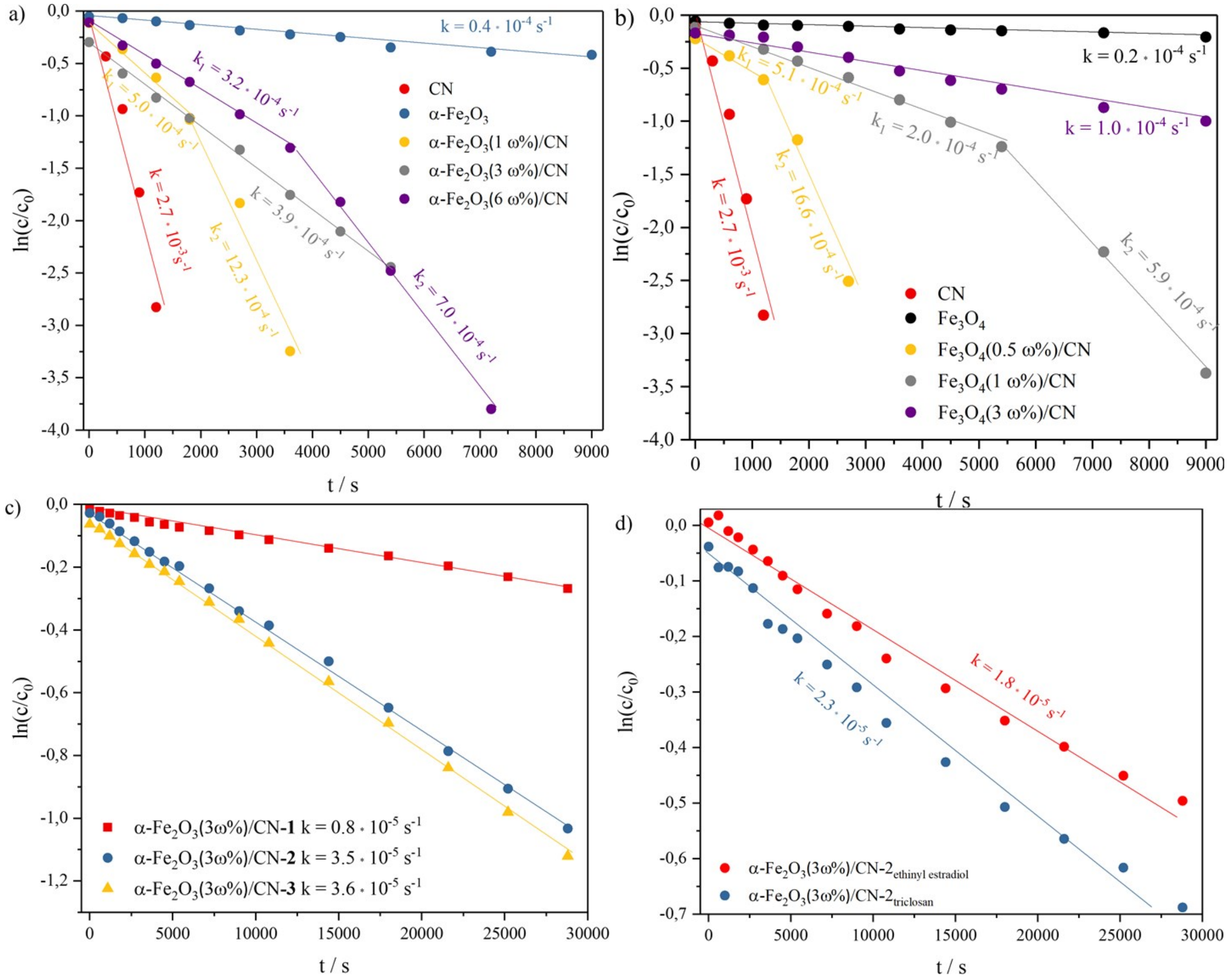
The determination of direct band gaps of CN and α-Fe_2O_3 follows the literature.[1-4] For the composites, direct and indirect band gaps were determined, using the baseline approach.[5] It is shown that there is no significant difference in the band gaps between the direct and indirect determinations. The values listed in the diagram denote the graphically determined band gap energies. However, the accuracy of the method only allows the band gap to be specified with one decimal.



SI 2: Tauc plot for the determination of the a) and b) direct band gaps CN, α-Fe_2O_3, α-Fe_2O_3/CN and Fe_3O_4/CN composites; c) and d) indirect band gaps for the α-Fe_2O_3/CN and Fe_3O_4/CN composites.

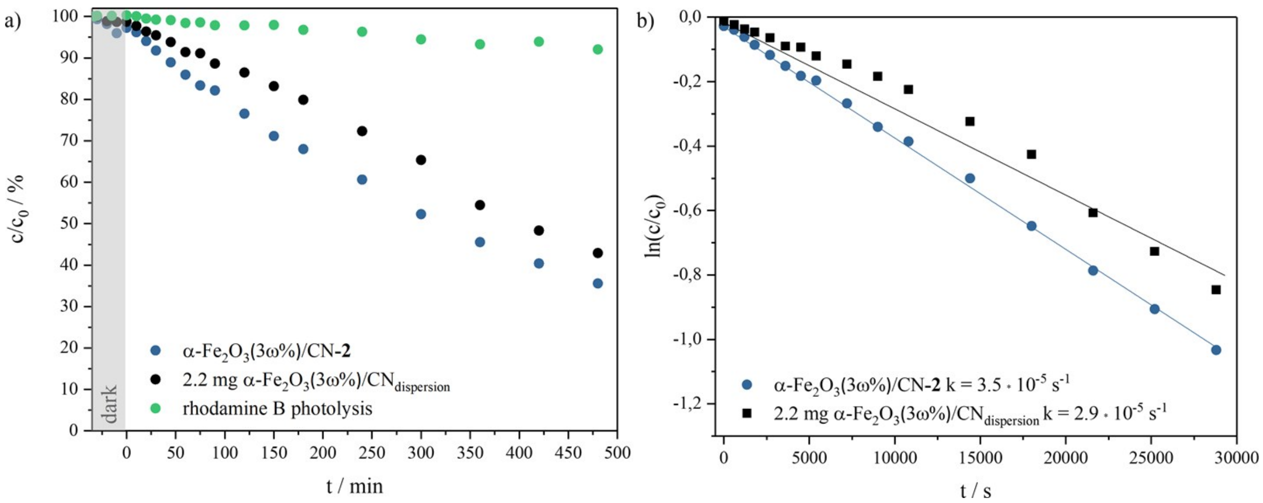


SI 3: Time-dependent photodegradation of an aqueous RhB solution ($1\cdot10^{-5}$ M) under visible light irradiation (t > 0 min), triple determination of the photocatalytic degradation of RhB with CN.



SI 4: Semi-logarithmic plot of the photodegradation of an aqueous RhB solution (t > 0 min) in presence of a) α-Fe_2O_3/CN compounds, α-Fe_2O_3 and CN; b) Fe_3O_4/CN compounds, Fe_3O_4 and CN; c) the coatings α-Fe_2O_3(3 ω%)/CN-**1**, α-Fe_2O_3(3 ω%)/CN-**2** and α-Fe_2O_3(3 ω%)/CN-**3** 2; d) for the photodegradation of EE2 and triclosan (t > 0) with α-Fe_2O_3(3 ω%)/CN-**2.**

The RhB degradation of the coating α-Fe_2O_3(3 ω%)/CN-**2** and of 2.2 mg dispersed α-Fe_2O_3(3 ω%)/CN are in a similar range. The difference is due to the fact that the low particle concentration used is not ideal for the reactor design used. Investigations showed that only at catalyst concentrations of > 40 $mg\cdot mL^{-1}$, the reaction rate constant is independent from the used catalyst mass.[6] In addition, the uniform irradiation of the photocatalyst material is essential. When using the immobilized coating, the substrate is located directly in front of the light source. When the same amount of particles is dispersed a uniform irradiation is not always guaranteed. Especially when using photocatalyst materials who show a photosensitiven degradation mechanism the used materials, the uniform irradiation is particularly important for high degradation rates.



SI 5: a) Time-dependent photodegradation of an aqueous RhB solution (1·10 5 M) under visible light irradiation (t > 0 min) without catalyst and in the presence of coatings α-Fe_2O_3(3 ω%)/CN-**2** and 2.2 mg of dispersed α-Fe_2O_3(3 ω%)/CN ; b) Semi-logarithmic plot of the photodegradation of the corresponding measurements.

References

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