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The NiO nanorode formation and its activate photocatalist by reduced graphene oxide

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Nickel oxide (NiO) nanostructures were synthesized by thermal decomposition of pre-synthesized $NiC_2O_4.2H_2O$ nanowires at three annealing temperatures (Ta): 400, 600, and 800K. The mechanism behind the effect of annealing temperature on the geometrical shape and optical character of the obtained NiO was supposed to be a consequence of magnetic exchange energy. The mechanism was considered concerning the antiferromagnetic phase transition below and above the Néel temperature of NiO that is TN=525K. Below TN, NiO nanowires (with a flaky shape) are formed, resulting in a strong UV absorption and a longer range of hysteresis loop. A little above TN, the magnetic energy is released, resulting in the decomposition of nanowires to irregular shapes and a lower UV absorption with a broader peak and a shorter range of hysteresis loop. After that, nickel (II) oxalate dihydrate nanowires, synthesized in the presence of graphene oxide, were thermally decomposed into a composite of graphene oxide and nickel oxide (GO-NiO) nanowires, and the composite was then reduced into a composite of reduced graphene oxide and nickel oxide(rGO-NiO) nanowires. UV–visible spectrophotometry showed that rGO could enhance the absorption of NiO nanowires, particularly in the visible region of light, and also could decrease their bandgap energy from 3.3 to 2.8eV. Photoluminescence spectroscopy indicated that rGO could vanish the PL intensity of NiO nanowires, meaning that the rGO-NiO sample has a lower e-h recombination rate than that of the NiO sample. It was shown that the incorporation of rGO could activateNio photocatalyst effect nearly equal to standard TiO_2-P25.

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