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**Unique surface structure of nano-sized CuInS₂ anchored on rGO thin film and
its superior photocatalytic activity in real wastewater treatment**

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Abstract: Nano-sized CuInS₂ was evenly anchored on the thin film of reduced graphene oxide (rGO/CuInS₂) by a simple one-step solvothermal method. The photocatalytic activity of rGO/CuInS₂ was much higher than that of pure CuInS₂, and was highly dependant on rGO amount with results revealing an optimal rGO content of 1wt.%. The 1% rGO/CuInS₂ composite demonstrated the highest visible-light photocatalytic activity with almost 90% 2-nitrophenol removal, which was almost two times of pure CuInS₂. The enhanced photocatalytic activity of rGO/CuInS₂ is ascribed to that the ultrathin film structure of rGO endows rGO/CuInS₂ composites with a large density of exposed active sites to reactants, short transport distances of photogenerated charges and the efficient separation of charge carriers. Of special significance is that 1% rGO/CuInS₂ composite can effectively treat real pharmaceutical wastewater with 86.5% chemical oxygen demand (COD) removal efficiency in 11 hours. Moreover, there was no obvious decrease in the photocatalytic

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