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A sustainable strategy for integrating Roxarsone degradation with As(V) recovery

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Roxarsone (ROX) is an organoarsenic compound that extensively served as feed additives in poultry industry. ROX tends to transform into more toxic inorganic arsenic in the natural environment. Post-treatments are necessary to completely eliminate arsenic contamination and relative environmental risks. In this study, a novelα-FeOOH@GCA nanocomposite was used as a bifunctional reagent for ROX decontamination. Activation of persulfate (PS) by α-FeOOH@GCA under UV irradiation (α-FeOOH@GCA/PS/UV) was first time employed for *in-situ* degradation of ROX and simultaneous adsorption of released arsenate (As(V)). Nearly 100 % of ROX was transformed in this system at relatively low dosage of α-FeOOH@GCA catalyst (250 mg L-1) and K2S2O8 (3 mM) after 120 min irradiation and the released As(V) from ROX oxidation could be simultaneously adsorbed onto the surface of α-FeOOH@GCA. The possible transformation pathway of ROX is proposed starting from the cleavage of As-C bond of ROX by the attacking from the dominant surface sulfate radicals produced in α-FeOOH@GCA/PS/UV system. The adsorbed As(V) on the surface of α-FeOOH@GCA derived from ROX oxidation was recovered as an efficient photocatalyst Ag3AsO4. This study provides an novel integrated design to simultaneously combine oxidation of ROX, immobilization of As(V) formed and reclamation of As(V) in regenerant as a photocatalyst.