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Synthesis of Cobalt oxide and Cu doped Cobalt Oxide for Biosensor

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Abstract

Objective(s)

Metal and metal oxide nanoparticles have, recently, been widely used in the field of electro chemistry where they have found applications in electroanalysis, electrocatalysis and biocatalysis, especially in sensors and biosensors fabrications. In addition, magnetic nanoparticles have also attracted the attention of researchers because they can be widely used in the collection or separation of the bioactive matters, targeted drug delivery, and diagnosis or therapy of the diseases. Because of the enhancement of their magnetic properties these magnetic nanoparticles will play more important roles in the biosensor field in coming days. Cobalt oxide is one of the magnetic nanoparticles. It also has been used as an effective, inexpensive and tolerant catalyst for oxidation reactions in gas sensors for human health and environmental monitoring.

Materials and Methods

In our work, Cobalt oxide and Cu doped Cobalt oxide nano powders with different Cu/Co = 0, 0.05, 0.08, 0.10, 0.125 and 0.15 mole ratio are prepared using sol – gel technique. The initial sol was prepared by cobalt chloride ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$), water and absolute ethanol and copper chloride ($\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$) was used as the source of dopant. Citric acid was used as complex agent and ethylene glycol as polymer agent. The gel was annealed at 550°C for gaining the final nanopowder.

Results and Conclusion

XRD patterns showed formation of Co_3O_4 , CuO and Cu_2O in cubic structure and the average grain sizes, calculated by scherrer formula, were about 45 to 60 nm depending on the Cu content.

Keywords: Nano powder, Nanoparticle, Biosensor, Sol – gel

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