

Optimizing of Photodynamic Therapy by using Natural Materials as a Photosensitizers

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Effect of irradiation incorporated with natural materials and antibiotics on cell lines, Erythrocytes, and bacteria such as (*Pseudomonas aeruginosa*, *Escherichia coli* and *Staphylococcus aureus*) has been investigated. The control of microbial growth by inhibiting or preventing the growth of microorganisms are necessary in case of medicine, agriculture and food sciences. The control or treatment consists of killing or inhibiting the microorganisms by using physical or/and chemical agents. Treatment involved natural photosensitizing materials such as Rose Bengal, Hypericin, Protoporphyrin, Cichorium Intybus, Photofrin, Iron oxide nanoparticle (Fe_3O_4), curcumin and nanocurcumin with and without light has been studied. Results showed that incorporating irradiation with drugs could inhibit or prevent the bacterial and cell line growth. In general, the results demonstrated that the viable counts are decreasing with induced dyes in the presence of light. The viable counts are increasing in the absence of light (in the dark) for all samples incorporated with pigment materials. The mortality rates are increasing in the presence of light depending on the structural wall of the cell. Our finding suggests that pigment materials incorporated with light could be used as a potential drug in photodynamic therapy. In addition, the results presented here suggest that pigment materials could play a major rule for the higher rate of inactivation of the gram-positive cells as compared with gram-negatives.

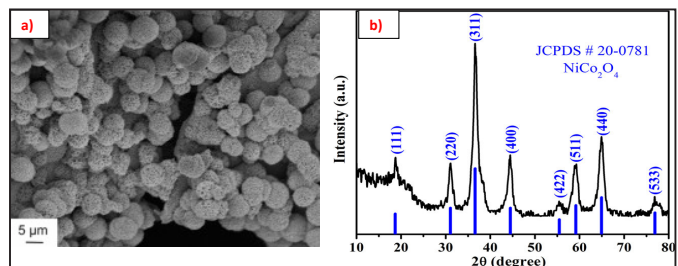


Fig.1. a) SEM image of NiCo_2O_4 , b) X-ray diffraction of NiCo_2O_4 powdered sample at 80 °C for 6 hours.