22nd Iranian Inorganic Chemistry Conference,
23-25 August, 2023
University of Kurdistan

# Title: Green synthesis of Nickel oxide nanoparticles by extract of Nigella sativa.

**Zahra Solgi,[a] Ali Babaie[b]**

**Author list: Zahra Solgi , Ali Babaie**

*[a]Department of Chemestry, Faculty of Science, Arak University, Arak, Iran*

*[b]Department of Chemestry, Faculty of Science, Arak University, Arak, Iran*

*[*]E-mail: zahrasolgi13778955@gmail.com*

Nanomaterials are the materials that have sizes on the order of a billionth of a meter. Since the mechanical, thermal, electrical, optical, electrochemical, catalytic properties of the nanomaterials are different from the bulk materials, nanomaterials can be used in a wide variety of application fields. [1].One of the most innovative methods consists of replacing polluting chemical reagents with living organisms like bacteria, fungi , plants , yeasts and etc, during inorganic and organic synthesis, to reduce the quantity of reagents and also save energy[2]. The advantages of using plant extracts during the green synthesis of nanostructures prompted researchers to examine the reduction mechanisms of metal salts, trying to understand the formation mechanisms of nanoparticles in the presence of plant extracts[3].Among various nanoparticles, nickel oxide nanoparticles (NNPs) are important because of their physical, chemical, and biological properties. In the past two decades, significant research has been done on the synthesis of NNPs. Their applications range from energy storage to catalysis to antifungal and antibacterial activity[4].In this research, nickel oxide nanoparticles synthesized by green synthesis method and using nigella sativa extract. Then the structural properties of nanoparticles characterized by XRD, SEM and FT-IR techniques.

***Keywords:*** Nanoparticles, Green synthesis, Nickel oxide

**References**

[1] Seifi, Hooman, et al. "A review on current trends in thermal analysis and hyphenated techniques in the investigation of physical, mechanical and chemical properties of nanomaterials." *Journal of Analytical and Applied Pyrolysis* 149 (2020): 104840.

[2] Boudiaf, Moussa, et al. "Green synthesis of NiO nanoparticles using Nigella sativa extract and their enhanced electro-catalytic activity for the 4-nitrophenol degradation." *Journal of Physics and Chemistry of Solids* 153 (2021): 110020.

[3] Parveen, Khadeeja, Viktoria Banse, and Lalita Ledwani. "Green synthesis of nanoparticles: Their advantages and disadvantages." AIP conference proceedings. Vol. 1724. No. 1. AIP Publishing, 2016.

[4] Narender, Sakhamudi Sai, et al. "Nickel oxide nanoparticles: a brief review of their synthesis, characterization, and applications." Chemical Engineering & Technology 45.3 (2022): 397-409.