# Review of: "Synthesis of Nickel Nanoparticles Using Ionic Liquid-Based Extract from Amaranthus viridis and Their Antibacterial Activity"

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### Abstract

1. Requires smoother transitions between sentences to enhance readability.
2. The term “bioactive components” could be briefly defined or exemplified for readers who may not be familiar with it.
3. The phrase “whose production was validated” could be rephrased to clarify what specific aspect of the nanoparticles’ production was validated (e.g., size, shape, or concentration).
4. The plant extract was used to synthesize nickel nanoparticles (Ni NPs)” — consider clarifying what process or method was used for synthesis, as this is a significant part of the study.
5. The acronym “DLS” is introduced without spelling out “Dynamic Light Scattering” first, which could be confusing for readers unfamiliar with the term.
6. In “Nickel nanoparticles were utilized for anti-bacterial activity,” the phrase “anti-bacterial activity” could be refined to “antibacterial activity” for consistency and accuracy.
7. Ensure consistent formatting for technical terms and acronyms (e.g., UV/Vis, TGA, etc.).
8. Consider elaborating on the significance of using microwave-assisted extraction and the choice of [C3MIM] Ac for readers who may not have a background in green chemistry or extraction methods.
9. Consider adding commas in lists for clarity (e.g., “X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, and thermogravimetric analysis (TGA)” for uniformity).

### Introduction

The introduction flows logically from a general overview of nanoparticles to a specific focus on nickel nanoparticles and their applications. However, the transition between topics (e.g., from the applications of nickel nanoparticles to the properties of ionic liquids) could be smoother. Consider linking the sections more explicitly to help guide the reader through your arguments.

1. In the sentence, "Research on nanoparticles is still underway, and they have uses in medication delivery and therapy, among other things," consider specifying that nanoparticles have a role in both drug delivery and therapy to clarify their significance.
2. The phrase "a novel extraction method based on microwave help" could be more precise, such as "a novel extraction

method based on microwave-assisted extraction" for clarity.

3. The term “ionic-liquids” should be spelled as “ionic liquids” without a hyphen.
4. The phrase “has become a major global issue” could be made more concise by saying “has become a major global concern.”
5. Consider rephrasing “the mechanical function, pressure, and heat effect” to “mechanical effects, pressure, and heat,” which flows better.
6. The sentence "Non-molecular ionic compositions containing both inorganic and organic ions are referred to as ionic liquids" could be simplified to "Ionic liquids are non-molecular compositions that contain both inorganic and organic ions."
7. Make sure that terms like “green synthesis” are briefly defined, especially for readers who may not be familiar with this concept in the context of nanomaterial production.
8. When mentioning “antibacterial and anti-cancer properties,” it might be helpful to briefly explain how these properties are assessed or measured.
9. Ensure consistent capitalization for terms like “Amaranthus viridus,” especially in formal writing.
10. In the list "anti-oxidant, antibacterial, and anti-cancer properties," the term "antioxidant" is more commonly written without a hyphen.
11. The reference numbers (e.g., [1], [2], etc.) should be placed consistently, either all at the end of sentences or integrated into the text as appropriate.

**Methodology**

1. The organization of the section is clear, with well-defined subsections. However, transitions between sentences could be improved for better readability. For instance, when moving from the materials to the synthesis section, a brief introductory sentence could help connect the two.
2. In the "Materials" subsection, specifying that "distilled water" refers to the type of water used for the extraction process would provide clearer context.
3. The phrase “the plant material (Amaranthus viridus)” appears in both "Material" and "Synthesis of nickel nanoparticle." Consider using "the plant material" once and referring back to it without repeating the scientific name unnecessarily.
4. In “The experiment utilized just distilled water,” consider rephrasing to “Only distilled water was used in the experiment” for a more active voice.
5. In "After being oven dried at 50 degrees Celsius and twice cleaned with distilled water," it could be clearer to say “after being dried in an oven at 50 degrees Celsius and washed twice with distilled water” for better clarity and grammatical accuracy.
6. The temperature unit should be consistently formatted as "°C" rather than "degrees Celsius" in some instances.
7. The sentence “the resultant nanoparticles underwent further characterization” could be strengthened by specifying what type of characterization was conducted.
8. When introducing methods such as “X-ray diffractometer” and “dynamic light scattering,” briefly explaining their purpose could benefit readers unfamiliar with these techniques.

9. The term “the EDX detector was used” could be expanded to clarify that it refers to Energy Dispersive X-ray Spectroscopy.
10. Ensure consistent formatting of temperature units (e.g., “10oC/min” should be “10 °C/min” for clarity).
11. In “This had receiving slits operating at 40 kV and 0.47° divergent,” rephrase for clarity. It is unclear what "this" refers to; it would be better to specify "The X-ray diffractometer" or another appropriate subject.
12. Ensure consistent use of terms and acronyms throughout (e.g., always using "S. aureus" after the first mention of "Staphylococcus aureus").
13. In "The agar diffusion assay was used to evaluate the nanoparticles' antibacterial activity," you could briefly mention why this method is appropriate for evaluating antibacterial activity.
14. When discussing the incubation of the bacteria, specify whether the broth was inoculated with a specific concentration of each bacterium to provide context.

**Results and Discussions**

The organization into subsections is clear, but the overall flow can be improved by ensuring that each section transitions smoothly into the next. For example, consider adding a brief statement at the end of each subsection to lead into the next topic.

In "3.1. UV-Vis analysis," it would be more logical to present the results of the antibacterial activity separately before detailing the methodology. This could help to avoid repetition and maintain reader engagement.

In “The antibacterial activity of synthetic nanoparticles was evaluated by subjecting them to tests against...” consider rephrasing for clarity: “The antibacterial activity of synthetic nanoparticles was evaluated using tests against...”

The sentence "Before Aeromonas hydrophilia, Escherichia coli, and Staphylococcus aureus were added, nutritional agar was equally covered on the petri plates" could be clearer if rephrased: “Nutrient agar was evenly spread on the Petri plates before inoculating them with Aeromonas hydrophilia, Escherichia coli, and Staphylococcus aureus.”

Ensure consistency in the capitalization of species names, such as "E. coli" instead of "E. Coli."

In "The major wide band in Figure 2 indicates the stretching vibration of OH at 3417 cm-1," consider replacing "wide band" with "broad band" for accuracy.

In the phrase “The aliphatic amines' C-N stretching vibration is represented by the band at 1080 cm-1,” consider rephrasing to “The band at 1080 cm-1 corresponds to the C-N stretching vibration of aliphatic amines” for improved clarity.

The use of “in that order” can be omitted for conciseness after mentioning crystal planes.

In "According to the Debye-Scherrer equation," it's essential to briefly explain this equation or its significance for readers who may not be familiar with it.

The TGA result for Ni NPs in the 100-500 oC range" should be revised to "The TGA results for Ni NPs in the 100–500 °C range" for consistency and clarity.

Ensure all temperatures are formatted consistently (e.g., “530 oC” should be “530 °C”).

In "the morphology of the nanoparticles may be established with the aid of the FESEM picture," consider rephrasing to "The FESEM images provide insights into the morphology of the nanoparticles" for clarity.

In "Energy dispersive X-ray analysis (EDX) was used to further corroborate the production of pure Ni NPs," you might want to specify what the EDX analysis revealed about purity.

When mentioning "polydispersed," consider defining this term briefly for readers who may not be familiar with it.

In "3.7. Anti-bacterial activity," provide a brief introduction about what the results in Figure 7 indicate before diving into the details of the zone of inhibition.

Specify the units of measurement when discussing the zones of inhibition (e.g., "mm") in the context of the results.