



Industrial Consultancy & Sponsored Research (IC&SR)

Metal/Metal Oxide Nanocomposites/Mixtures as an Antibacterial Agent and the Method of Preparation thereof **IITM Technology Available for Licensing**

Problem Statement

- In the present era, **Copper** is an essential trace micronutrient and dietary mineral which assists in certain metabolic functions for the life sustenance of the human beings & other living organism.
- Further, copper is one of the most utilized metal elements in the world in electrical units as wires & motors, agricultural poison, architectural materials, corrosion-resistant coating for marine environments etc.
- Moreover, **Zinc Oxide (ZnO)** is a well-known semiconductor material that is widely used in optical and electrical equipments.
- Based on prior arts patent literature survey, it is noted that **copper-zinc oxide (Cu/ZnO)** composites have superior antibacterial action than the pure components, i.e. copper & zinc oxide, the prior art of preparation of Cu-ZnO material is **laborious, time-consuming, expensive**.
- Hence, there is a need to address the issues in efficient manner.

Technology Category/ Market

Technology: Metal Oxide Nanocomposites as an Antibacterial Agent ;

Industry: coating, nanofiber, graphene.

Applications: Electronics, Pharmaceutical, other

Market: The global nanocomposites market is projected to grow at a **CAGR** of **16.20%** during forecast period of **2023** to **2028**.

Intellectual Property

IITM IDF Ref. 1622; Patent No.357190

TRL (Technology Readiness Level)

TRL- 3, Proof of Concept & validated in Lab

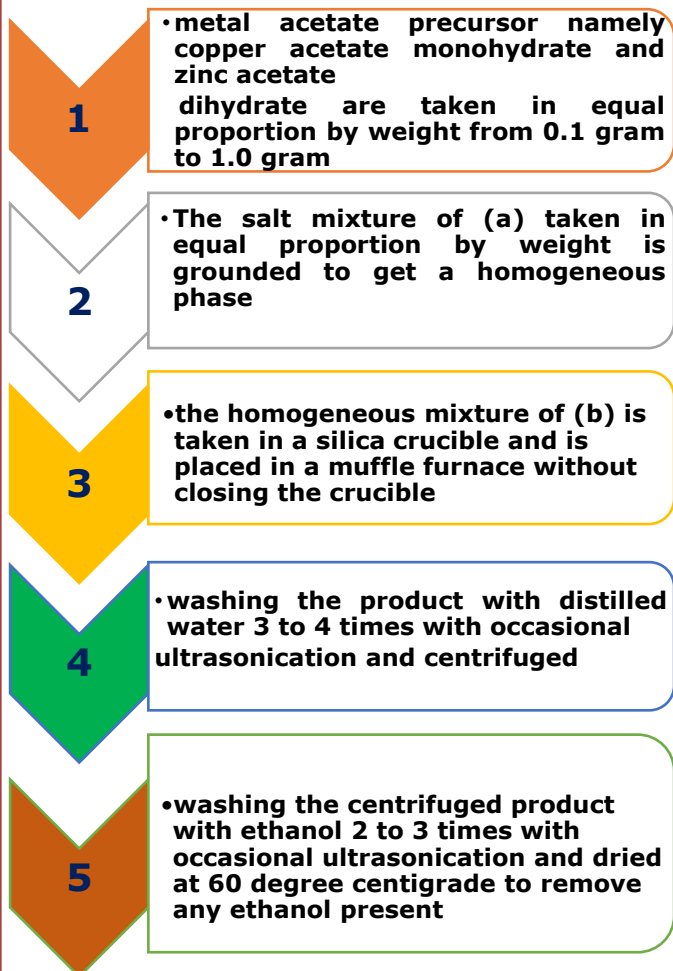
Research Lab

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Technology

- Present invention describes a **method** of preparing **metallic Cu-ZnO nanocomposite** with high antibacterial activity by **low temperature solid-state reactions of Cu and zinc acetate combinations.** (Refer **FIG.1**)
- The method comprising the steps of:



- Further, the copper remains metallic in the prepared nanocomposite.

CONTACT US

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Key Features / Value Proposition

❖ **Technical Perspective:**

1. Facilitates a method of preparing **metallic Cu-ZnO mixture with high antibacterial activity.**
2. Provides a method of preparing **metallic Cu/ZnO nanocomposite along with XRD evidence for the formation of said nanocomposite.**
3. The **antibacterial activity** mainly due to the **strong adsorption of positively charged Cu ions to bacterial cells**, which imparts **antibacterial efficacy** in a concentration-dependent manner.

❖ **Industrial Perspective:**

1. The nanocomposite/mixture **exhibits antibacterial activity** against **Gram positive** and **Gram negative** bacteria within 8 hours of inoculation shown in **Fig 2.**
2. This **antibacterial composition** is effective in **killing E. coli and B. cereus** in less than **24 hours.**

Images

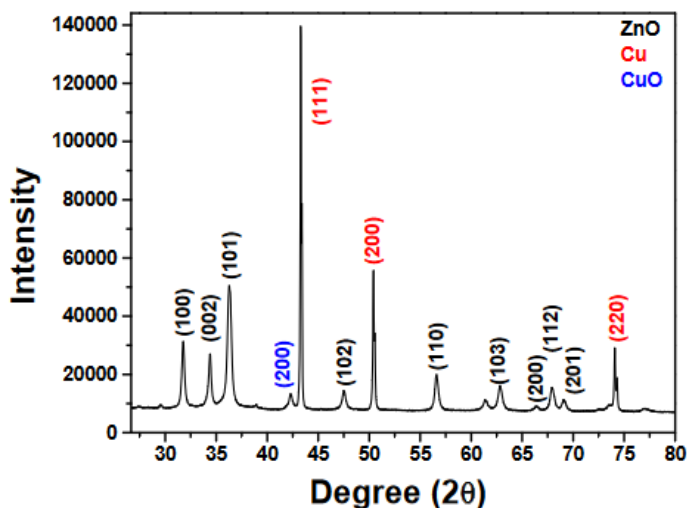


Fig 1: Illustrate schematic representation of X-ray diffractograms of the Cu/ZnO nanocomposite material, copper (red), ZnO (black) and CuO (blue);

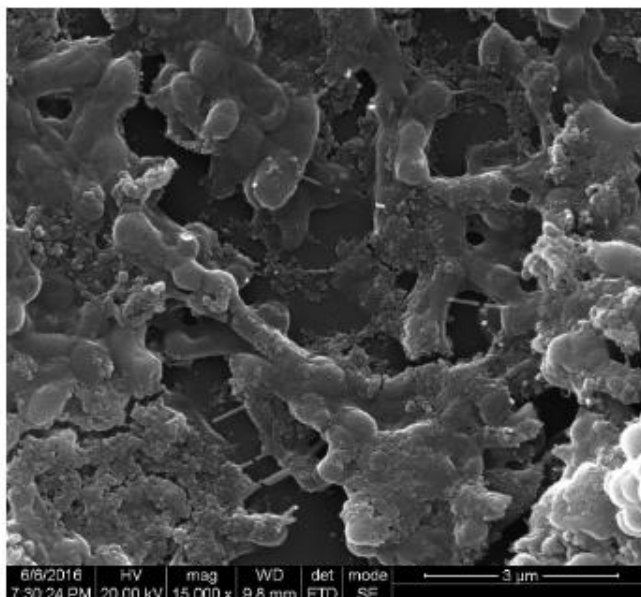


Fig.2 illustrates scanning electron microscope image of treated E. coli cells with Cu-ZnO nanocomposite after 8 hours of inoculation

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