METHOD FOR SELECTIVE EXTRACTION OF GOLD BY NIACIN

IITM Technology Available for Licensing

Problem Statement

- In the present era, it is necessary to recover gold from waste including nano waste and electronic waste to meet the growing demand of the metal.
- There are a few methods used for recovery of gold, as discussed in the prior art, which are **Expensive, time consuming and unsustainable**.
- The present invention overcomes the above-mentioned deficiencies by providing an **environment-friendly** solution.

Technology Category/ Market

Chemical Technology: Extraction of Gold;

Industry: Chemicals, Electronics, Healthcare; **Applications:** Nanomedicines, Imaging, sensors, Probes, catalysts, Life-sciences

Market: The global gold nanoparticles market size was USD**4.4** billion in 2021 and expected to register a revenue **CAGR** of **12.6%** during the forecast period (2022 to **2030**).

Technology

Present Patent describes a method for selectively precipitating and **extracting gold** in aqueous solutions and the method comprises of steps given below:

1. Adding **conc. HCl** and **HNO_3** in **3:1 ratio** to the **gold bearing raw materials** to obtain dissolved gold solution of HAuCl4;
2. **Adding saturated niacin** in water to the dissolved gold solution HAuCl4 to precipitate [AuCl4] - [2Niacin+H]+ complex.
3. **Filtering** the obtained precipitate of the second step to remove impurities.
4. **Adding a reductant** to the recovered **[AuCl4] - [2Niacin+H]+ complex** of third step to reduce the complex and to extract gold metal.

- Thus, **niacin selectively precipitates** and **recovers gold** from gold containing acidic mixtures at concentrations as low as **300ppb.**
- The other ions in the solution can be any common ion such as sodium, calcium, aluminum, etc.

Insert Image

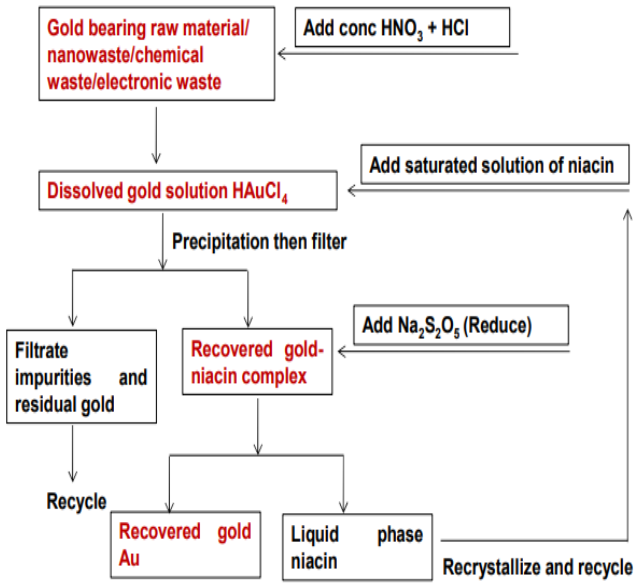

Fig 1. Gold recovery flow chart using niacin

Intellectual Property

IITM IDF Ref. **2100;**

Patent **No. 374251**

PCT Application No. **PCT/IN2021/051021**

TRL (Technology Readiness Level)

TRL- 3/4, Proof of Concept Ready and tested, and validated in Laboratory.

Research Lab

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Key Features / Value Proposition

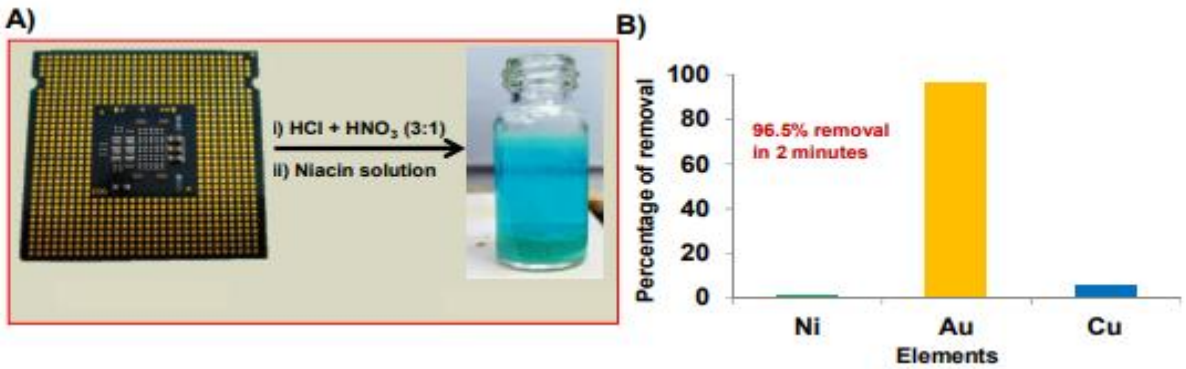
❖ ***Technical Prospective:***

1. Raw material comprises waste samples including **chemical wastes, electronic wastes and laboratory nano-wastes,** and precipitation occurs at **room temperature.**
2. The niacin precipitates and recovers about **96.5% of gold** in **2 minutes** from an electronic waste composed of Au, Cu and Ni.

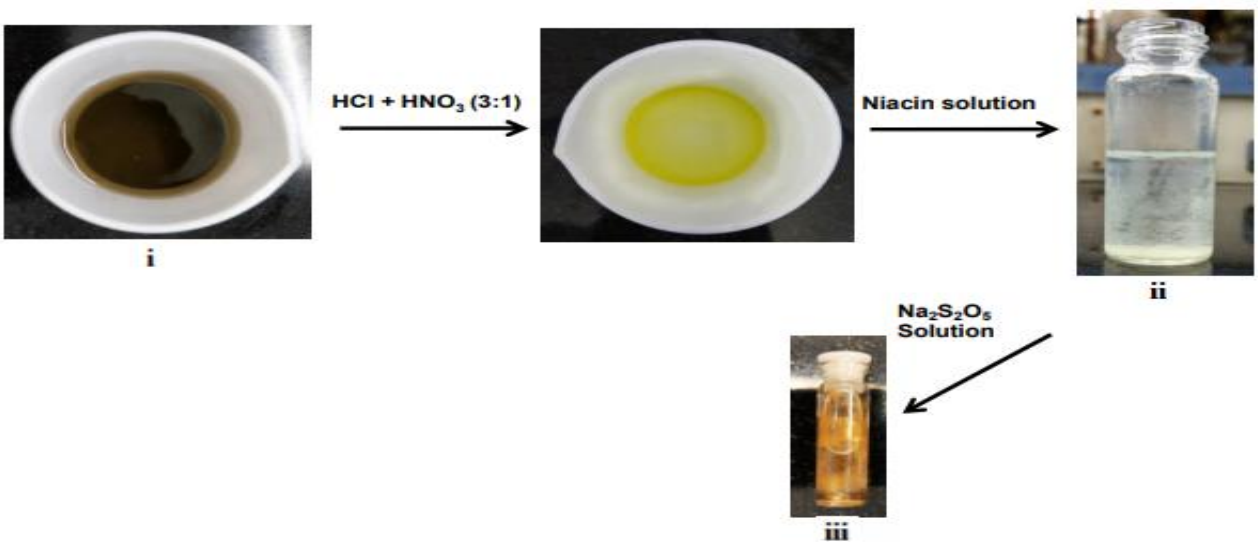
❖ ***Industrial Prospective:***

1. The present invention discloses a **fast precipitation** and **extraction method of gold** in **water** by a **simple biomolecule, niacin**, which is **cost effective** & **efficient**.

Images



Figs 2A & 2B: Gold recovery from a central processing unit (CPU) (2A); Recovered elements shown in the right side (2B);



Figs. 3(i, ii, iii): Gold recovery from gold nano-waste.

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