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Biosynthesis of copper oxide nanoparticles with and without capping agents V.1

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We use this protocol and it's working

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Abstract

This protocol describes the synthesis of copper oxide nanoparticles using a *Caesalpinia sappan* extract as a reducing agent with and without different capping agents. Copper oxide nanoparticles were prepared by reducing copper sulfate dissolved in water with the aqueousextract of *C. sappan* according to our previously described method (Sasarom et al, 2023).

Materials

Materials
1. Copper sulfate pentahydrate
2. Gelatin
3. Polyethylene glycol 400
4. Polysorbate 80
5. Octyl phenol ethoxylate
6. Sodium lauryl ether sulfate
7. Mannitol
8. Gelatin
9. Lyophilized powder of the extract of C. sappan
10. Ethanol
11. Sodium hydroxide
12. Milli-Q water

Equipment
1. Magnetic stirring
2. A centrifuge
3. a sonicator
4. An oven

Biosynthesis of copper oxide nanoparticles (CuONPs)

1 19 mL of 10 mM copper sulfate (or 44 mg per solution) were heated to 70°C for 10 min under magnetic stirring.

2 10 mL water, or 10 mL of studied capping agents (Gelatin, polyethylene glycol 400, polysorbate 80, octyl phenol ethoxylate, sodium lauryl ether sulfate and mannitol) was added to the copper solution.

3 60 mg of the lyophilized powder of the extract of C. sappan was dissolved in 6 mL water.

4 After 5 min of sonication, 1 mL of the extract was added to the different copper sulphate solutions which were subsequently stirred for 30 min at 70°C.

5 The acid mixtures (pH ~3) were adjusted to pH 10 by addition of 400 µL of a 1 M NaOH solution and stirred for 2 h at 70°C.

6 The excess extract was removed by centrifugation of the nanoparticle dispersion at 8000×g for 30 min.

7 The obtained pellet was redispersed in 30 mL milli-Q water and this precipitation/washing procedure was repeated two times.

8 The precipitate was dispersed in absolute ethanol and dried at 60°C for 8 h.

9 The particles were transferred into light-protecting containers and stored in a desiccator at room temperature until use.

Protocol references

Sasarom M, Wanachantararak P, Chaijareenont P, Okonogi S. Biosynthesis of copper oxide nanoparticles using *Caesalpinia sappan* extract: *In vitro* evaluation of antifungal and antibiofilm activities against *Candida albicans*. 2023;17(4):238–247.

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