BOOK of ABSTRACTS

6th INTERNATIONAL CONFERENCE ON PLANT BIOLOGY

(25th SPPS Meeting)

5-7 NOVEMBER 2026
NOVI SAD, SERBIA



Serbian Plant Physiology Society

Institute for Biological Research "Siniša Stanković"
– National Institute of the Republic of Serbia, University of Belgrade

Faculty of Sciences, University of Novi Sad

University of Belgrade, Faculty of Biology

Institute for Multidisciplinary Research
– National Institute of the Republic of Serbia, University of Belgrade

Serbian Biological Society "Stevan Jakovljević" Kragujevac

Maize Research Institute "Zemun Polje"

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Phyto-Mediated Synthesis and Characterization of CuO Nnanoparticles Using *Urtica dioica* L. Extract

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Phyto-mediated synthesis of metal oxide nanoparticles has attracted growing interest as a simple, sustainable, and environmentally friendly alternative to conventional chemical synthesis routes. This study aimed to synthesize copper oxide nanoparticles (CuO NPs) using *Urtica dioica* L. (stinging nettle) aerial part extract as a natural source of bioactive compounds involved in nanoparticle formation and stabilization. The polyphenolic profile of *U. dioica* is characterized by flavonoids such as rutin, kaempferol, and quercetin, along with phenolic acids (e.g. chlorogenic, ferulic, and caffeic acid). CuO NPs were synthesized using $CuSO_4x5H_2O$ as the copper precursor and a 0.2% aqueous nettle extract, with the reaction pH adjusted to 4–5 using NaOH. The synthesis process was monitored by UV–Vis spectroscopy over a 120-minute period, while the resulting material was characterized using Fourier-transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). Time-dependent changes in the UV–Vis spectra, accompanied by a distinct visible color transition of the reaction mixture from blue through greenish to dark green, indicated the progressive evolution of nanoparticle formation. FTIR analysis revealed characteristic shifts in the functional groups of the plant extract, suggesting the active involvement of phytochemicals in nanoparticle nucleation and stabilization, with absorption bands in the lower wavenumber region attributed to Cu–O bond vibrations. TEM imaging revealed heterogeneous particles with predominantly irregular, polygonal, and plate-like morphologies, along with a pronounced tendency toward agglomeration. These findings highlight the potential of *U. dioica* as a natural, low-cost agent for the successful synthesis of CuO-based nanomaterials, supporting the broader development of green nanotechnology approaches.

KEYWORDS: green synthesis; copper oxide nanoparticles; *Urtica dioica*; plant extract; nanoparticle characterization

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Phyto-mediated synthesis and characterization of CuO nanoparticles using *Urtica dioica* L. extract

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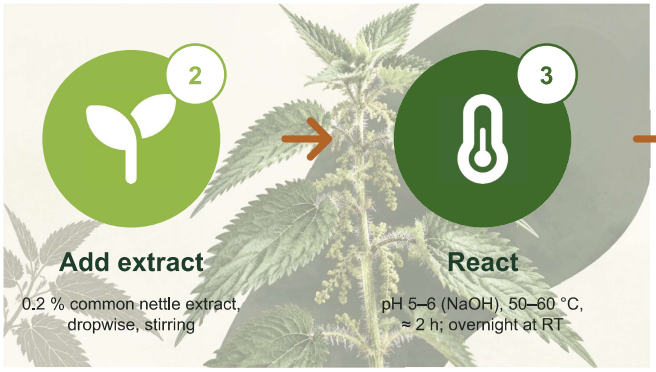
FROM LEAF TO NANOPARTICLE



1 Copper salt
$CuSO_4 \cdot 5H_2O$ (50 mM)

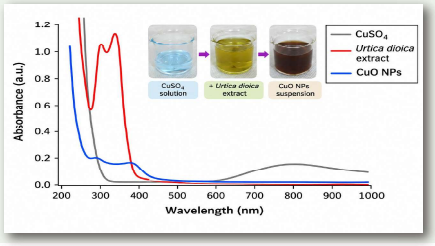
2 Add extract
0.2 % common nettle extract, dropwise, stirring

3 React
pH 5–6 (NaOH), 50–60 °C, ≈ 2 h; overnight at RT

4 Collect
Centrifuge, wash, dry → dark brown CuO powder

The mixture changes colour from blue (Cu^{2+}) to green to dark brown as CuO nanoparticles form.

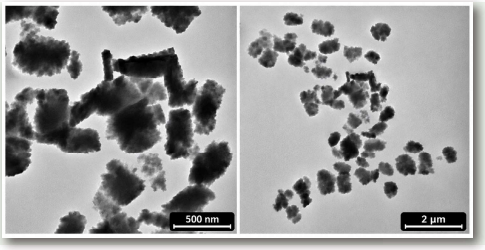
THE EVIDENCE



UV–Vis SPECTROSCOPY

Spectral changes support CuO nanoparticle formation

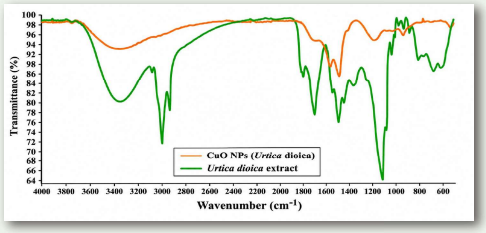
UV–Vis spectra reveal differences between $CuSO_4$, *Urtica dioica* extract, and the synthesized CuO nanoparticles. These spectral changes, accompanied by a visible color change, support nanoparticle formation.



TEM

Particles are truly nanoscale

TEM images reveal irregularly shaped, predominantly polygonal particles exhibiting pronounced agglomeration (scale bars: 500 nm and 2 µm).



FTIR SPECTROSCOPY

Plant compounds stay on board as stabilizers

FTIR spectral changes suggest the involvement of plant-derived functional groups in the formation and stabilization of CuO nanoparticles.

WHY IT MATTERS

- Renewable plant source
- Low-cost, readily available
- Mild conditions (50–60 °C)
- Plant molecules as natural stabilizers

***Urtica dioica* L. (common nettle) extract is a natural, low-cost mediator for the green synthesis of CuO nanoparticles.**

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Scan for contact

This study was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Agreement No. 451-03-33/2026-03/200378).