

# **Agen Antibakteri Nanopartikel Tembaga Oksida yang Disintesis dengan Metode Ablasi Laser Pulsa**

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## **Abstrak**

Agen antibakteri koloid nanopartikel tembaga oksida (CuO NPs) telah berhasil disintesis menggunakan metode ablasi laser pulsa. Koloid CuO NPs memiliki stabilitas yang baik pada medium larutan poly vinyl pyrrolidone (PVP). Koloid CuO NPs berwarna kuning keemasan dan lebih pekat saat frekuensi tembakan laser semakin tinggi. Karakterisasi CuO NPs dilakukan menggunakan Scanning Electron Microscope - Electron Dispersive X-ray Spectroscopy (SEM-EDX), Transmission Electron Microscope (TEM), Ultraviolet-Visible Spectroscopy (UV-Vis) dan Fourier Transform Infrared Spectroscopy (FTIR). Hasil karakterisasi menunjukkan bahwa CuO NPs berbentuk bulat (spherical) dengan ukuran terkecil diperoleh pada frekuensi tembakan laser rendah. CuO NPs dalam medium larutan PVP memiliki ukuran yang jauh lebih kecil dari CuO NPs dalam medium aquades pada frekuensi tembakan laser yang sama. Uji koloid CuO NPs sebagai agen antibakteri dengan konsentrasi 20 ppm, 30 ppm dan 40 ppm terhadap bakteri *Staphylococcus Aureus* dan *Escherchia Coli*, menunjukkan efek antibakteri semakin baik pada konsentrasi tinggi, ditunjukkan dengan diameter of inhibition zone (DIZ). Pada konsentrasi 40 ppm untuk bakteri *S. Aureus* menunjukkan DIZ 3,10 mm dan bakteri *E. Coli* menunjukkan DIZ 2.40 mm. Ukuran CuO NPs lebih kecil memiliki efek antibakteri lebih baik ditunjukkan pada zona bening di sekitar konsentrasi koloid CuO NPs 20 ppm pada media *E. Coli*.

**Kata kunci** : Agen Antibakteri, Nanopartikel Tembaga Oksida, Metode Ablasi Laser Pulsa, poly vinyl pyrrolidone (PVP)

# **The Antibacterial Agent of Copper Oxide Nanoparticles Synthesized with the Pulse Laser Ablation Method**

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## **Abstract**

The antibacterial agent of copper oxide nanoparticles (CuO NPs) colloid has been successfully synthesized using the pulse laser ablation method. Colloid CuO NPs has good stability in poly vinyl pyrrolidone (PVP) solution. CuO NPs colloids are golden yellow and more concentrated when the laser repetition rate is higher. Characterization of CuO NPs was carried out using Scanning Electron Microscope - Electron Dispersive X-ray Spectroscopy (SEM-EDX), Transmission Electron Microscope (TEM), Ultraviolet-Visible Spectroscopy (UV-Vis) and Fourier Transform Infrared Spectroscopy (FTIR). Characterization results show that CuO NPs is spherical shape with the smallest size obtained at low laser repetition rate. CuO NPs in PVP solution medium has a much smaller size than CuO NPs in aquades medium at the same of laser repetition rate. Examination of CuO NPs colloid as an antibacterial agent with a concentration of 20 ppm, 30 ppm and 40 ppm against *Staphylococcus Aureus* and *Escherchia Coli* bacteria, shows that the antibacterial effect is better at high concentrations, indicated by a diameter of inhibition zone (DIZ). At a concentration of 40 ppm for *S. Aureus* bacteria showed DIZ 3.10 mm and *E. Coli* bacteria showed DIZ 2.40 mm. Smaller size of NPS CuO has better antibacterial effect shown in clear zone around the concentration of CuO NPs 20 ppm in *E. coli* media.

**Keywords:** Antibacterial Agents, Copper Oxide Nanoparticles, Pulse Laser Ablation Method, poly vinyl pyrrolidone (PVP)

**Pembimbing Akademik**

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