SINTESIS KARBON NANODOT TERDOPING NITROGEN DAN TERMODIFIKASI COLISTIN UNTUK DETEKSI BAKTERI *Escherichia coli*

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INTISARI

Penelitian tentang sintesis karbon nanodot terdoping nitrogen dan termodifikasi colistin (N-CNDCol) serta dikaji kemampuannya untuk deteksi *E. coli* telah dilakukan. Pada penelitian ini dipelajari pengaruh konsentrasi urea sebagai sumber dopan nitrogen. Sebelum tahap sintesis N-CND termodifikasi colistin, optimasi waktu iradiasi dilakukan pada 4, 8, 12, 16, dan 20 menit. Pengaruh dopan ditinjau melalui variasi konsentrasi urea yaitu pada 0%, 10%, 25%, 50%, 75% dan 100% dari berat asam sitrat. Waktu iradiasi dan konsentrasi urea yang telah teroptimasi selanjutnya digunakan untuk sintesis N-CNDCol. Pada tahap ini, konsentrasi colistin dibedakan menjadi 10, 20, 30, 40, dan 50 mg kemudian hasil yang optimum digunakan untuk deteksi bakteri *E. coli*.

Berdasarkan spektrum FTIR, terbukti bahwa atom N yang berasal dari urea berhasil terdoping dengan adanya karakteristik vibrasi ikatan C–N dan C=N. Pembentukan N-CNDCol dicirikan dengan pergeseran vibrasi ulur dari C=O. Karakterisasi dengan XRD dan citra TEM menunjukkan bahwa material yang disintesis bersifat semikristalin dan memiliki ukuran rata-rata sekitar 15,32 nm. Spektrum fluoresensi menunjukkan bahwa intensitas tertinggi diperoleh pada kadar urea sebesar 50% dan massa colistin sebesar 30 mg. Setelah diaplikasikan pada *E. coli* memberikan respon penurunan intensitas fluoresensi seiring bertambahnya jumlah bakteri. Limit deteksi (LOD) yang diperoleh sebesar 1,514 cfu mL^{-1}.

Kata Kunci: N-CND termodifikasi colistin, asam sitrat, urea, *Escherichia coli*, fluoresensi

SYNTHESIS OF COLISTIN MODIFIED N-DOPED CARBON NANO DOTS FOR Escherichia coli bacteria DETECTION

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ABSTRACT

Synthesis of colistin modified nitrogen doped carbon nanodot (N-CNDCol) has been conducted and evaluated for its ability to detect E. coli. In this present study, the influence of urea concentration as the source of Nitrogen dopant was also investigated. Before preparing N-CNDCol, optimization of irradiation time was conducted for 4, 8, 12, 16, and 20 minutes. Then, the effect of dopant was examined by varying urea masses of 0%, 10%, 25%, 50%, 75%, and 100% from citric acid masses. Finally, the optimized irradiation time and urea concentration were employed to synthesize N-CNDCol. In this stage, masses of colistin were also varied at 10, 20, 30, 40, and 50 mg and eventually applied to E. coli detection.

FTIR spectra validated that the nitrogen atom from urea was successfully doped as pointed by characteristic vibrations of C–N and C=N. N-CNDCol was identified to be formed by examining the wavenumber shift of the C=O stretching mode. XRD characterization and TEM image exhibited that the entire synthesized materials were crystalline with an average size of 15.32 nm. The fluorescence spectrum showed that the highest intensity was obtained at a urea content of 50% and a colistin mass of 30 mg. After application to E. coli showed that fluorescence intensity decreased as bacterial concentration increased. The lowest limit of detection (LOD) was 1.514 cfu mL^{-1}

***Keywords**: Colistin modified N-CND, citric acid, urea, Escherichia coli, fluorescence*