



## Abstract

The use of green substrates such as cellulose derivatives in the preparation of nanocomposites has many advantages such as high surface to volume ratio, porous structure, proper hydrophilicity, biocompatibility and affordable prices. In the present study, a Pd/Al layered double hydroxide/carboxymethyl cellulose nanocomposite (CMC@Pd/Al-LDH) was fabricated using carboxymethyl cellulose as a green substrate via co-precipitation method. The structure of prepared nanocomposite was investigated by X-ray powder diffraction, scanning electron microscopy, transmission electron microscopy and electrochemical techniques. Then, the CMC@Pd/Al-LDH was immobilized via the drop-casting of a suspension onto a glassy carbon electrode and was used as an electrochemical sensor toward hydrogen peroxide. The results showed that the proposed sensor showed high capability for measuring hydrogen peroxide by increasing the signal (peak-voltammetric current) compared to the initial electrode. Also, under optimized experimental conditions, a linear relationship was observed between the cathodic peak currents and the concentration of hydrogen peroxide within the range of 1–350  $\mu\text{M}$  with the detection limit ( $S/N = 3$ ) of 0.3  $\mu\text{M}$ . Finally, the efficiency of the proposed sensor for measuring hydrogen peroxide in basil plant was evaluated by calculating percentages of recovery (96.30 – 98.54%). The results of the research showed that the proposed sensor can be used to measure hydrogen peroxide with acceptable accuracy and repeatability.

**Keywords:** Hydrogen peroxide, Basil, Plant support, Bio-based nanocomposite, Layered double hydroxides, Electrochemical sensor



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**Use of plant based supports for the synthesis of layered  
double hydroxide nanocomposites to determine the  
amount of some biological compounds in plant**

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