

## Field: MAT

## Reduction of Cu<sup>2+</sup> ions removed from laboratory waste using carboxymethyl cellulose film

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### Highlights

Reduction of Cu<sup>2+</sup> ions removed from laboratory waste through adsorption on carboxymethyl cellulose film and thermal post-treatment at 170 °C and 200 °C in air.

### Abstract

This study aims to recover copper from laboratory waste containing Cu<sup>2+</sup> ions through adsorption and post-reduction via thermal treatment. Carboxymethyl cellulose (CMC) and CMC-glycerol (10%) films were immersed in synthetic CuSO<sub>4</sub> solutions (80 g/L). After 12 hours contact with the solution and drying in an oven with an air atmosphere, at 60 °C, each dried film was heated for 20 min in air, at 170 °C or 200 °C, temperatures below the degradation point of CMC. Compared to the controls (films without copper), an intense color change was observed in the copper-containing materials, as shown in Figure 1a. X-ray diffraction (XRD) patterns indicated the reduction of Cu<sup>2+</sup> to Cu<sup>0</sup> and Cu<sup>1+</sup> (Figure 1b), possibly due to the oxidation of CMC and glycerol hydroxy groups. This effect was also observed at room temperature, but at a slower rate. Research is ongoing to confirm the proposed mechanism for the observed phenomenon.

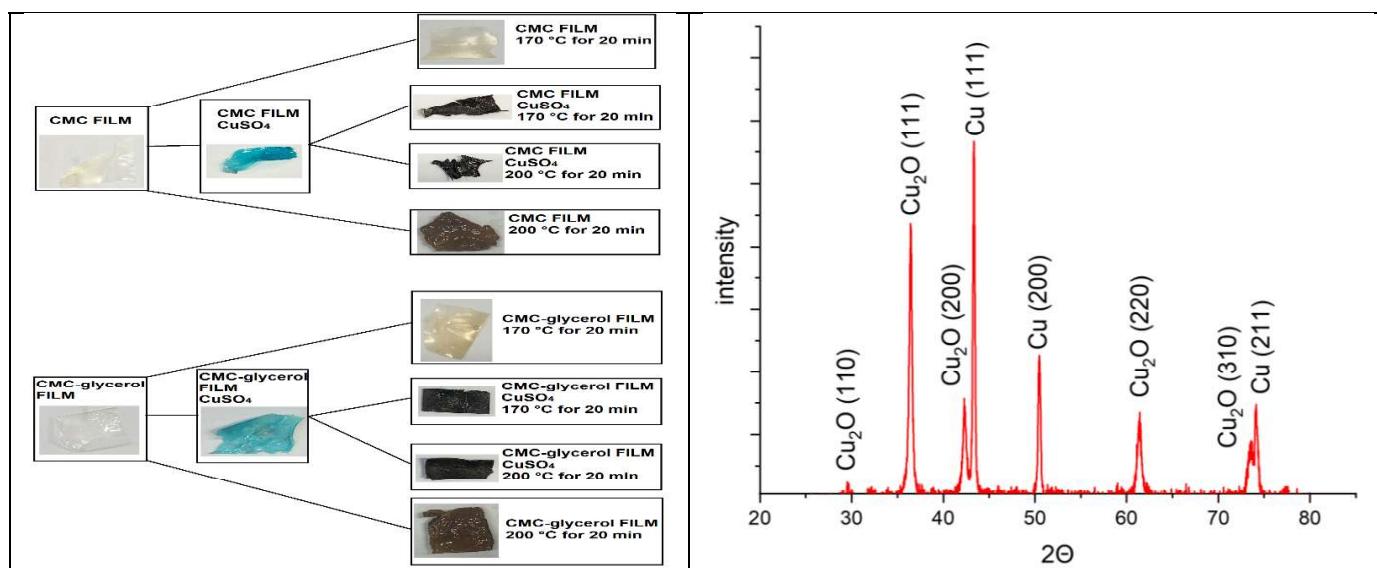


Figure 1. (a) Digital photographs of CMC and CMC-glycerol films before and after heating at 170 and 200 °C. (b) XRD pattern obtained for the CMC-glycerol film treated at 200 °C.

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