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ANTICANCER ACTIVITY OF CARBOXYLATED GRAPHENE OXIDE NANOADJUVANTS AND CURCUMIN

David De Jesus Martiliano De Avila¹, Carlos David Grande Tovar²

Grupo de Investigación de Fotoquímica y Fotobiología, Universidad del Atlántico, Puerto Colombia, Colombia. dmartilano@mail.uniatlantico.edu.co, carlosgrande@mail.uniatlantico.edu.co

INTRODUCTION & AIM

Osteosarcoma is a type of bone cancer that occurs mainly in children, adolescents, and young adults, producing malignant bone tumors. Conventional treatments for this type of cancer have limitations.

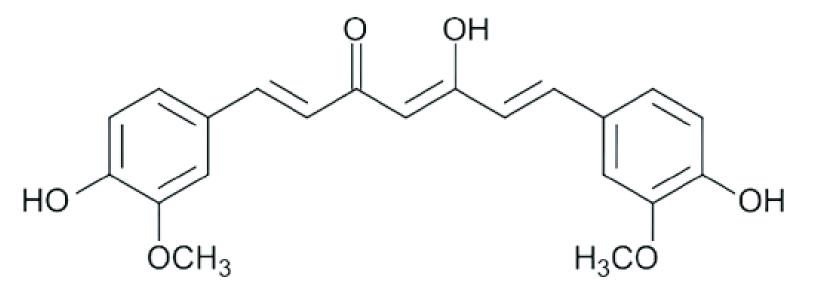


Figure 2. Structure of curcumin in enol configuration.

Synthesis of GO-COOH

GO-COOH in water (0.5 mg/mL) + CUR

in EtOH (0.5 mg/mL) 1:1

Characterization

GO in water

FT-IR spectrometer

UV-VIS spectrophotometer

X-ray diffractometer (DRX)

(2 mg/mL)

Studies have demonstrated greater safety and efficacy of drugs loaded onto graphene oxides (GO) functionalized with carboxyl groups (COOH).

Chloroacetic acid, Sodium

hydroxide

Photoelectron X-ray

spectrometer (NAP-

Raman spectrometer

ray diffraction. C) Elemental composition determined by XPS.

FWHM (°)

5,68

3,76

0,90

Nanomaterial

GO-COOH

GO-COOH-CUR

A Nanomaterial

GO-COOH

Angle

25,67

9,91

GO-COOH-CUR

XPS)

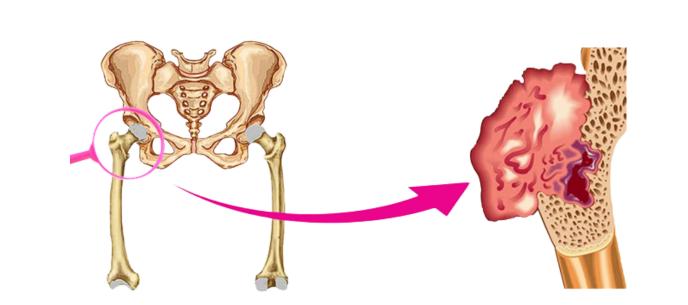


Figure 1. Bone neoplastic process located in the proximal femur

Curcumin (CUR) is a natural medicine with pharmacological activity, notable for its antioxidant and anticancer properties.

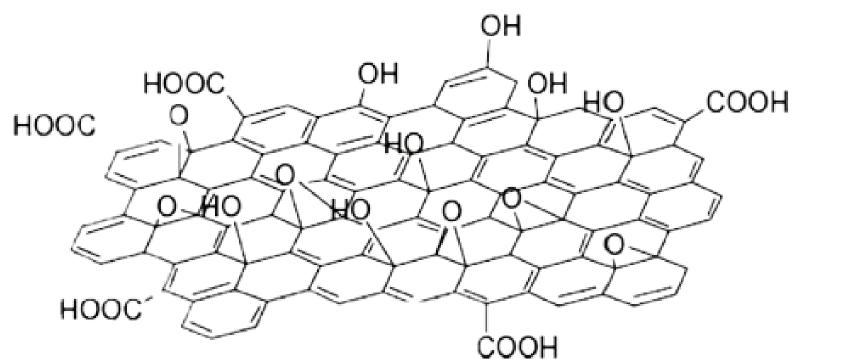


Figure 3. Structure of graphene oxide

Drying at 60°C for

12 hours

Synthesis of GO-COOH-CUR

In vitro cytotoxicity assay

In vitro evaluations with bone cancer cell lines (MG-63

osteosarcoma) and human osteoblasts, using the Resazurin

Drying at 40-60°C

for 12-16 hours

D

Therefore, the aim is to synthesize and evaluate the therapeutic potential of a carboxylated graphene oxide-curcumin (GO-COOH-CUR) nanoadduct using in vitro assays for the treatment of osteosarcoma.

METHOD

Centrifugation

4000 rpm/25 min

assay.

Nanomaterial

GO-COOH-CUR

GO-COOH

Ultrasound

probe for 3

hours

Transmission electron

Atomic force microscope

RESULTS

microscope

Table 1. A) Analysis of the intensities of the D, G, and 2G bands by Raman spectroscopy. B) Analysis by X-

1,43

1,86

d(nm) H(nm) n

1,50

2,27

9,25 9-10

0,35

0,89

ID/IG I2D/IG La(nm)

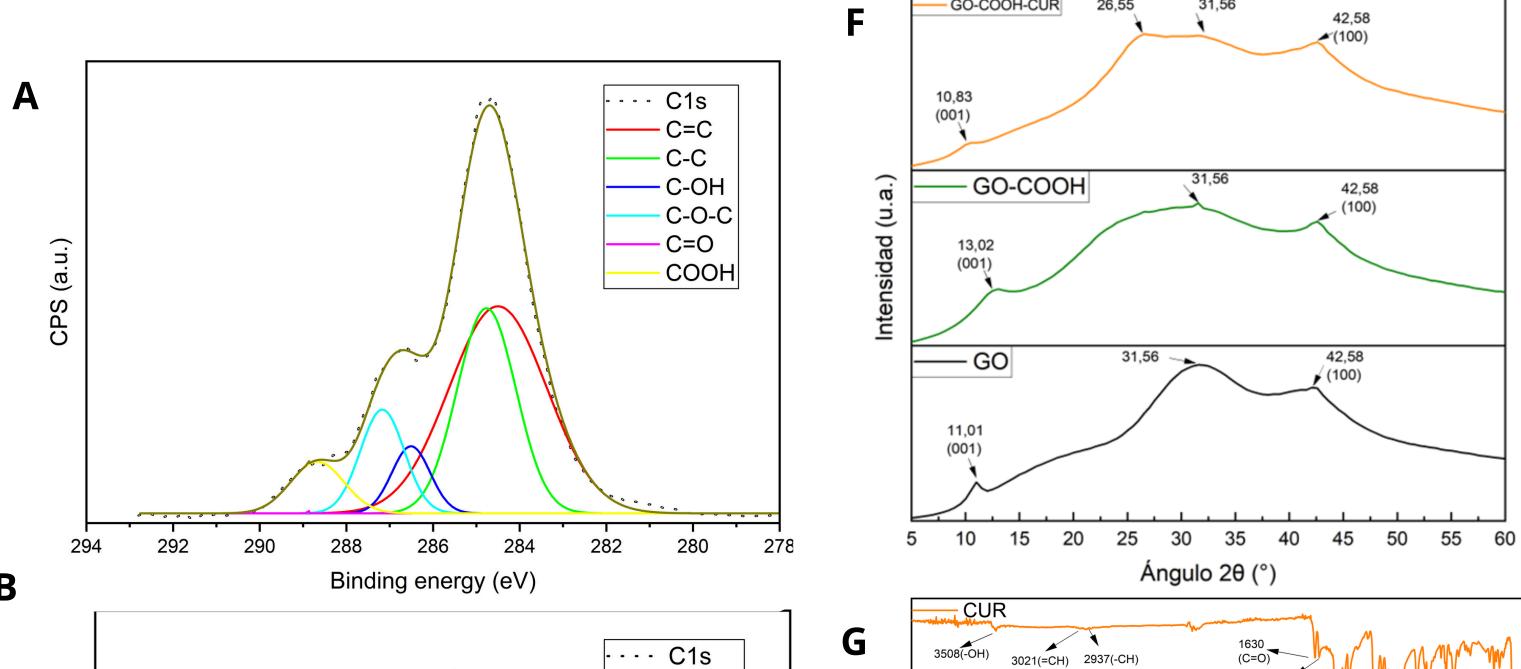
0,13

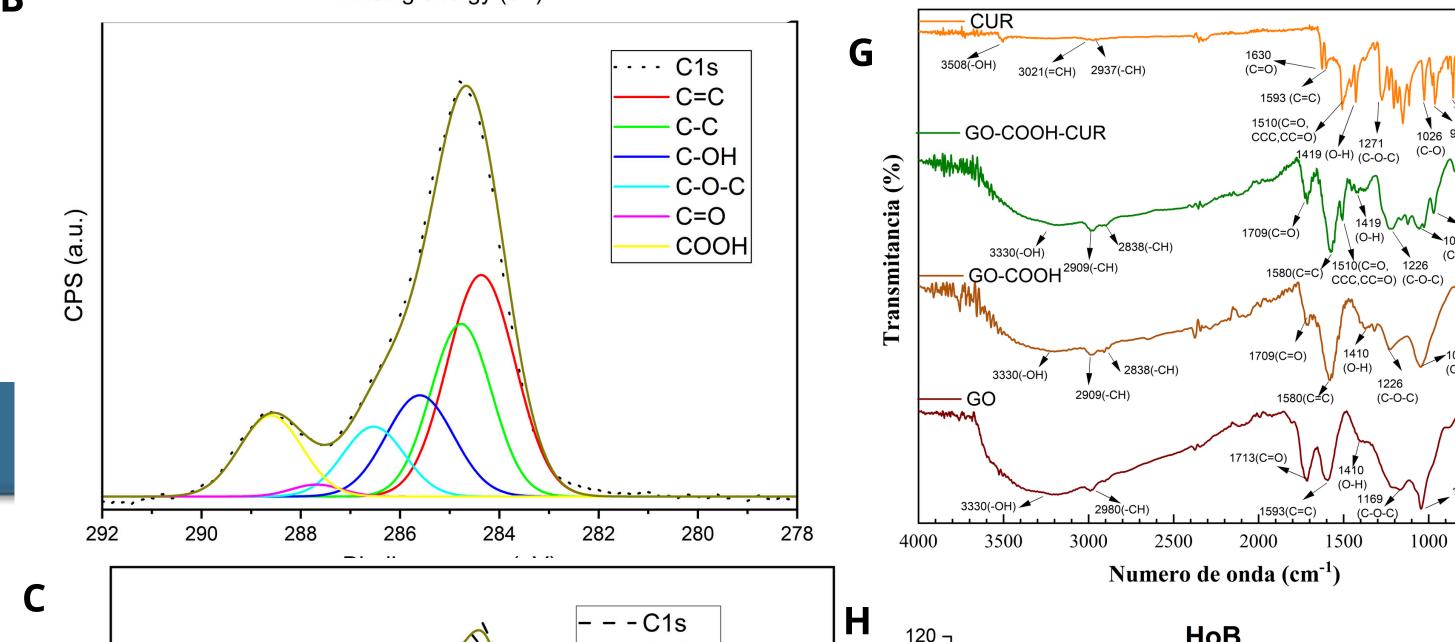
0,45

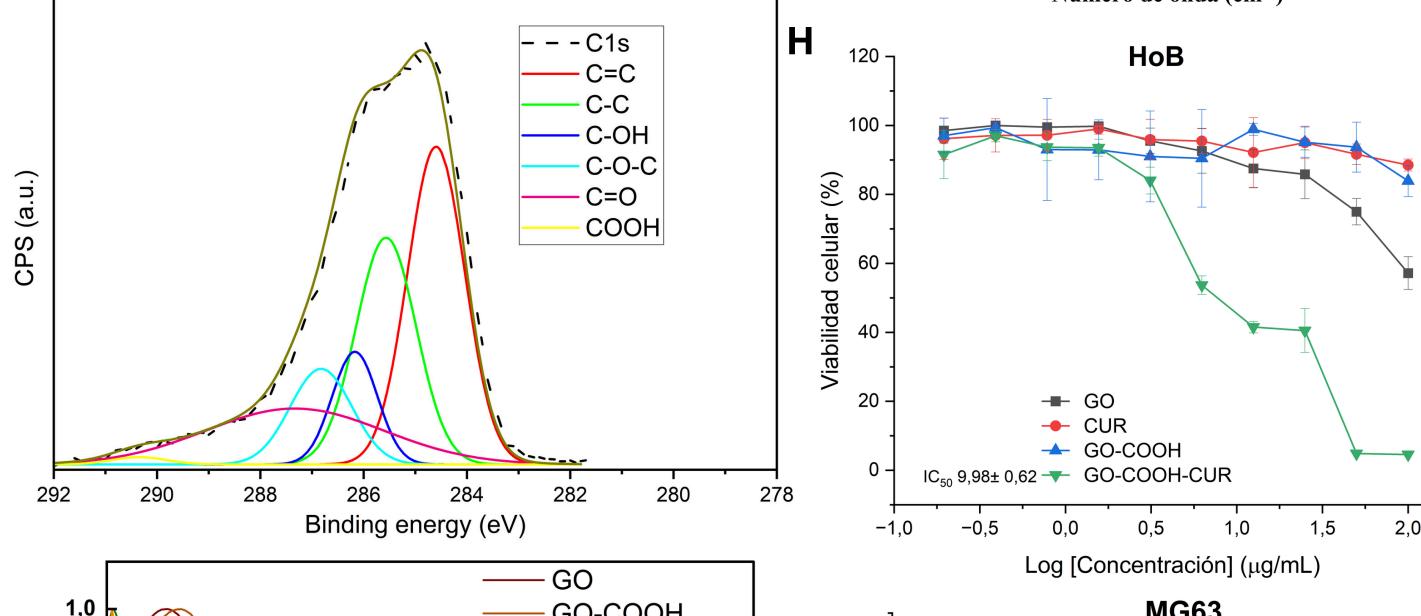
Shake at 600 rpm

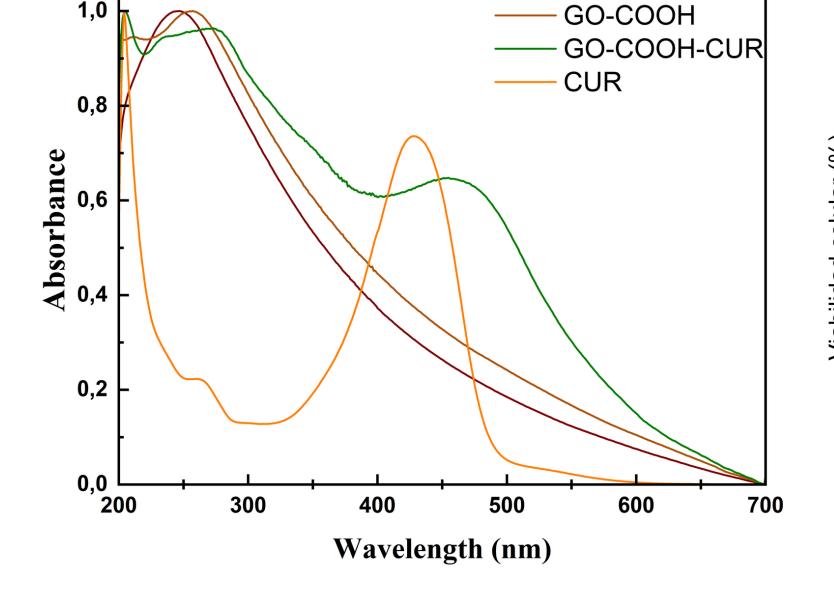
for 12-24 hours.

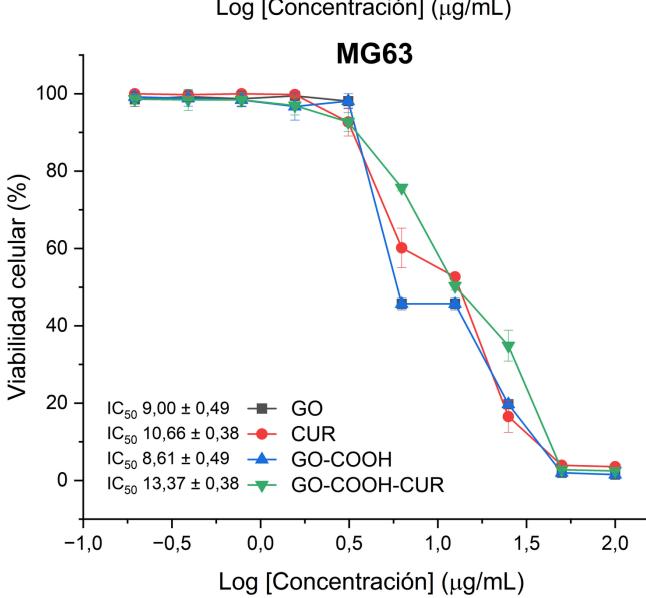
RESULTS & DISCUSSION

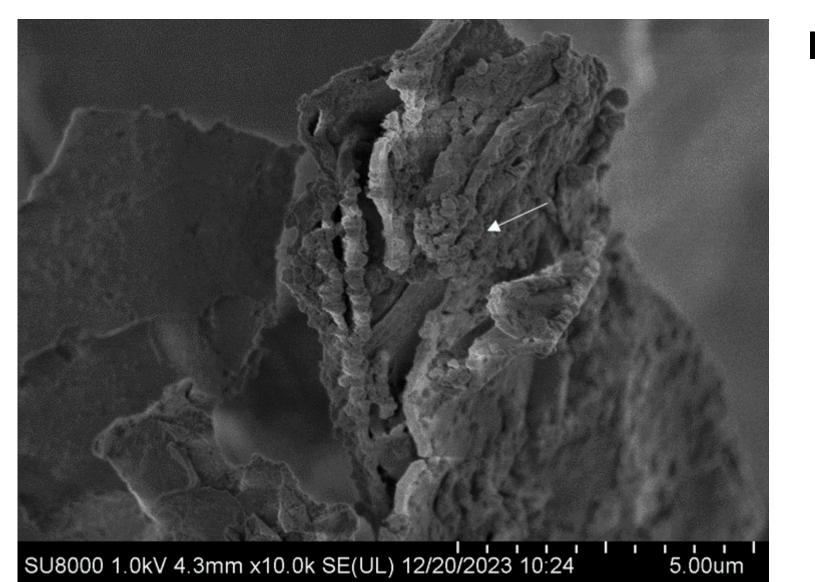


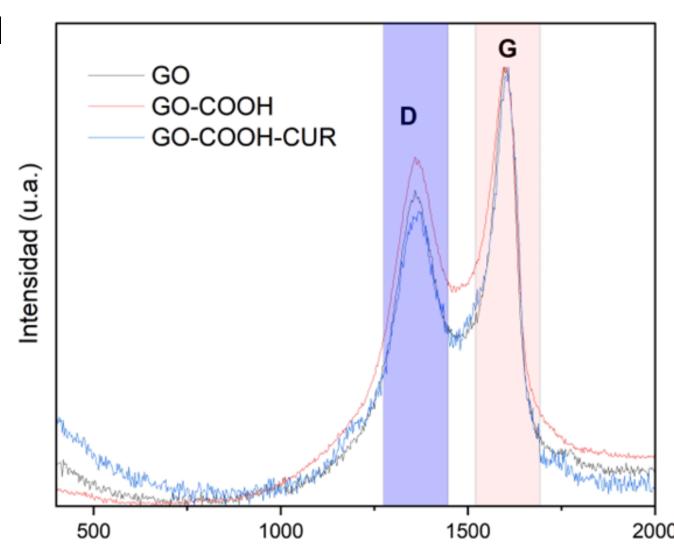












Desplazamiento Raman (cm⁻¹) Figure 4. A, High-resolution C1s XPS spectrum of GO; B, High-resolution C1s XPS spectrum of GO-COOH; C, high-resolution C1s XPS spectrum of GO-COOH-CUR; D, UV-vis spectrum of GO, GO-COOH, and GO-COOH-CUR; E, SEM image of GO-COOH-CUR; F, diffractogram of GO, GO-COOH, and GO-COOH-CUR; H, cell viability of GO, GO-COOH, and GO-COOH-CUR against HoB and MG-63; I, Raman spectrum of GO, GO-COOH, and GO-COOH-CUR.

CONCLUSION

23,82

13,39

10,32

• Each modification of GO shows alterations in its chemical and structural composition, due to the elimination of oxygenated groups and the inclusion of COOH and CUR groups.

• The nanoadduct demonstrated good cytocompatibility and cytotoxic activity against osteosarcoma. We propose optimizing the formulation between CUR and GO-COOH and using photothermal therapy to improve the anticancer activity of the adduct.

Others

(%)

2,22

22,703 3,647 0,303

9,672 0,393

0,215

(%)

17,299

25,492

80,481

73,650

FUTURE WORK / REFERENCES

