MS30-2-9 Nanoporosity control by molecule-loaded nanofibre filters for residual water treatment
#MS30-2-9

B.A. Paez-Sierra [1], D.K. López-Gómez [2]
[1]Universidad Militar Nueva Granda, Campus Nueva Granada - Cajiá (Colombia), [2]Universidad Militar Nueva Granda, Campus Nueva Granada - Cajicá (Colombia)

Abstract
One of the technologies that have grown the most in the last two decades for wastewater treatment uses filtration membranes. This work presents molecule-loaded nanofibre mats produced by the electrospinning process. The nanofibres consist of polycaprolactone (PCL) acting as a thermoplastic, while the load molecule is a chalcone derivative with varying concentrations from 0.0% to 1.0%. Analysis of electron scanning microscopy (SEM) images reveals average fibre diameter from about 90 nm to about 400 nm and diameters in inverse relation to the chalcone concentration. In addition, from FT-IR analysis it was determined that quantum confinement is achieved for the loaded molecules and increases in proportion to the chalcone molecule. This finding is correlation with the diameter of the PCL:Chalcone nanofibres. Based on a two-dimensional Poisson distribution, the porous diameter of the filters was about 1400 nm for 0.0% molecule-loaded nanofibres while for 10%, concentration went down to about 110 nm. Interestingly, the pore size is proportional to the nanofibre diameter for specific surface mass density per porosity of the filters. Finally, all filters were tested with acid mine drainages (AMD), and ionic charge retention is related to the concentration of the loaded molecule and nanofibre diameter.

Acknowledgements
This work was supported from funding provided by Vice-Rector for Research – Universidad Militar Nueva Granada, Campus Nueva Granada, grant number IMP-CIAS 3115.

References
[1] Diana, E.J., Kanchana, U.S., Mathew, T.V., Anilkumar, G., 2020. Recent developments in the metal catalysed cross-coupling reactions for the synthesis of the enone system of chalcones. Applied organometallic chemistry 34, n/a.
[2] Figueroa Ariza, L., Duarte Espinosa, M. and Páez Sierra, B., 2020. Low-cost microwave reactor for green synthesis of nanomaterials. Ingeniería Solidaria, 16(2).
[3] Páez-Vélez, C., Castro-Mayorga, J.L., Dussán, J., 2020. Effective Gold Biosorption by Electrospun and Electrosprayed Bio-composites with Immobilized Lysinibacillus sphaericus CBAM5. Nanomaterials (Basel, Switzerland) 10, 408.