EFFECT OF CROSSELINKING DENSITY ON DIELECTRIC RELAXATION IN POLY(VINYL ALCOHOL) HYDROGELS OBTAINED BY FREEZING-THAWING TECHNIQUE

Martha Elena Londoño López\textsuperscript{a}, Juan Manuel Jaramillo Ocampo\textsuperscript{b}, Roser Sabater i Serra\textsuperscript{c}, Juan Manuel Vélez Restrepo\textsuperscript{d}

\textsuperscript{a}Biomedical Engineering Research Group EIA-CES, Escuela de Ingeniería de Antioquia, Km 2 variante al aeropuerto José María Córdova, Envigado, Colombia. pfmalon@eia.edu.co
\textsuperscript{b}Electromagnetism Applied Group, Universidad EAFIT, Carrera 49 N° 7 Sur 50 Medellín, Colombia.
\textsuperscript{c}Centre de Biomaterials i Enginyeria Tissular -Universitat Politècnica de València Camí de Vera 14 - 46022 València – Spain
\textsuperscript{d}Universidad Nacional de Colombia, Science and Technology of Materials Group, Carrera 80 65 223 Facultad de Minas, Medellín, Colombia.

ABSTRACT

Physically crosslinked poly (vinyl alcohol) (PVA) hydrogels obtained by the repeated freezing/thawing (F/T) technique have been investigated by termomechanical analysis and dielectric relaxation spectroscopy (DRS). The crosslinked polymer was produced by the clustering of chains caused by the association of a polar group of the dissolved polymer followed by polymer crystallization. The dielectric spectra obtained from -50 °C to 200 °C shows two relaxation processes associated to local mobility and conductivity. These processes are strongly affected by the freezing/thawing cycles. Parameters associated to activation energy and dielectric relaxation strength were crosslinked dependent, fig. 1. Dielectric and modulus formalism was used to analysis the behavior of samples, according to the result, Cole-Cole approach is the best fitted to the experimental points of 8C and 12C samples, and Havriliak-Negami approach is best fitting to the experimental point of the WC, 4C and 6C samples.

Fig. 1: Dielectric relaxation strength $\Delta M$ versus temperature for PVA samples.

KEYWORDS: Poly(vinyl alcohol), hydrogels, dielectric relaxation, dielectric modulus

Acknowledgement: The authors gratefully acknowledge the financial support from the Engineering School of Antioquia, CES University.