

# **Mechanical and thermal behaviour of an acrylic bone cement modified with a triblock copolymer**

E. Paz Jiménez; F. Forriol Campos; J. Abenojar Buendia; J.C. Real Romero; N. Dunne; Y. Ballesteros Iglesias

## **Abstract-**

The basic formulation of an acrylic bone cement has been modified by the addition of a block copolymer, Nanostrength<sup>®</sup> (NS), in order to augment the mechanical properties and particularly the fracture toughness of the bone cement. Two grades of NS at different levels of loading, between 1 and 10 wt.%, have been used. Mechanical tests were conducted to study the behaviour of the modified cements; specific tests measured the bend, compression and fracture toughness properties. The failure mode of the fracture test specimens was analysed using scanning electron microscopy (SEM). The effect of NS addition on the thermal properties was also determined, and the polymerisation reaction using differential scanning calorimetry. It was observed that the addition of NS produced an improvement in the fracture toughness and ductility of the cement, which could have a positive contribution by reducing the premature fracture of the cement mantle. The residual monomer content was reduced when the NS was added. However this also produced an increase in the maximum temperature and the heat delivered during the polymerisation of the cement.

## **Index Terms-**

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If you institution has a electronic subscription to Journal of Materials Science: Materials in Medicine, you can download the paper from the journal website:

[Access to the Journal website](#)

## **Citation:**

*Abenojar, J.; Ballesteros, Y.; del Real-Romero, J.C.; Dunne, N.; Forriol Campos, F.; Paz, E. "Mechanical and thermal behaviour of an acrylic bone cement modified with a triblock copolymer", Journal of Materials Science: Materials in Medicine, vol.27, no.4, pp.72-1-72-10, April, 2016.*