11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

SILOXANE-POLYPROPYLENEOXIDE HYBRIDS USED AS MATRIX FOR INCORPORATION AND RELEASE OF PROPRANOLOL CHLORIDE

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The ability of assembling inorganic, organic and even bioactive components in a single material represents an exciting direction for developing novel multifunctional hybrids materials. In such hybrids, the association at a nanometric scale of both organic and inorganic phases leads to new materials presenting unique properties such as high mechanical resistance, transparency and flexibility, being suitable for applications in many technological areas, including the human health ones. The versatility of Sol-Gel process used for hybrids synthesis allows to obtain transparent monolithic films and bodies that can be explored for the fabrication of several types of controlled drug delivery devices, like as implants, adhesives, masks, microspheres etc…The aim of this work was to incorporate different amounts of propanolol (drug used for heart diseases) in Siloxane-Polyoxypropylene (PPO) hybrids matrixes prepared by Sol-Gel process in order to reach a control of drug release by changing drug concentration and preparation conditions. First results obtained from XRD show that, despite the pure hybrid matrix being totally amorphous, samples prepared with mechanical stirring exhibit crystalline structures close but different from pure propanolol powder. For such samples, the crystalline character of the nanocomposites increases with drug concentration. For hybrids prepared with ultrasound XRD spectra are typically amorphous, even at high drug contents. For such composites scanning electron microscopy (SEM) reveals the presence of nanometric drug-rich domains, while for samples prepared with mechanical stirring the domains are of micrometric size. The poor affinity of drug with the hybrid network in samples prepared by using mechanical stirring was confirmed by preliminary results on delivery process. The release of propranolol in such samples is completed in few minutes, independently of drug concentration, and the release mechanism follows a first order kinetics. The study of concentration effect of the drug in matrixes prepared with ultrasound is still in course but preliminary studies reveals, as expected, a better affinity to the matrix.

References

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