

7th Annual Congress on

Materials Research and Technology

February 20-21, 2017 Berlin, Germany

On-demand release of paclitaxel and 5-fluorouracil using thermo responsive poly(NIPAAm-co-HMAAm)/polyurethane partnered with alternating magnetic field induced hyperthermia on non-vascular nitinol stent

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Gastrointestinal malignancies have been a tremendous problem in the medical field and cover a wide variety of parts of the system, (i.e., esophagus, duodenum, intestines and rectum). Usually these malignancies are treated with palliation with the use of non-vascular nitinol stents. However, stenting is not a perfect solution for the problem. While it can enhance the quality of life of the patient, in time the device will encounter problems such as reocclusion due to the rapid growth of the tumor. Therefore, a functional cover made up of core-shell nanofibers with a unique combination of thermo responsive polymeric shell and stretchable polymeric core for non-vascular nitinol stents that uses an alternating magnetic field (AMF) to induce heat in the stent for hyperthermia therapy and simultaneously release 5-fluorouracil and/or paclitaxel was designed. Varied ratios of NIPAAm to HMAAm monomer resulted in different LCST properties was utilized for an on-demand drug release. Biocompatibility test using NIH-3T3 fibroblast cells indicates that the composite with drug content are biocompatible and the *in vitro* cancer cytotoxicity test using ESO26 and OE21 cancer cells proved that the material shows cancer cytotoxic properties via combination of dual drug and hyperthermia therapy. With this functional material, we propose a tailorable and on-demand drug release with more control that can be employed for a combination drug therapy/single drug therapy combined with hyperthermia therapy for cancer cytotoxicity effect.

Biography

Ludwig Erik Aguilar has his expertise in "Creating and modifying medical devices to enhance their effectiveness". He works primarily on stimuli responsive polymers and their application for controlled drug delivery on vascular and non-vascular stents and other medical implants with the use of electro spinning and other fabrication methods. He also has experience in creating and utilizing other polymeric materials and exploits their intrinsic properties to be used as a biomaterial and for drug delivery systems.

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