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pH and Temperature Triggered Release of Doxorubicin from Hydogen Bonded Multilayer Films of Polyoxazolines

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Abstract : Polymers that change their properties in response to different stimuli (e.g. light, temperature, pH, ionic strength or magnetic field) are called ‘smart’ or ‘stimuli-responsive polymers’. These polymers have been widely used in biomedical applications such as sensors, gene delivery, drug delivery or tissue engineering. Temperature-responsive polymers have been studied extensively for controlled drug delivery applications. As regard of pseudo-peptides, poly (2-alky-2-oxazoline)s are considered as good candidates for delivery systems due to their stealth behavior and nontoxicity. In order to build responsive multilayer films for controlled drug release applications from surface, Layer by layer technique (LBL) is a powerful technique with an advantage of nanometer scale control over spatial architecture and morphology. Multilayers can be constructed on surface where non-covalent interactions including electrostatic interactions, hydrogen bonding, and charge-transfer or hydrophobic-hydrophobic interactions. In the present study, hydrogen bounded multilayer films of poly (2-alky-2-oxazoline) s with tannic acid were prepared in order to use as a platform to release Doxorubicin (DOX) from surface with pH and thermal triggers. For this purpose, poly (2-isopropyl-2-oxazoline) (PIPOX) and poly (2-ethyl-2-oxazoline) (PETOX) were synthesized via cationic ring opening polymerization (CROP) with hydroxyl end groups. Two polymeric multilayer systems ((PETOX)/(DOX)-(TA) complexes and (PIPOX)/(DOX)-(TA) complexes) were designed to investigate of controlled release of Doxorubicin (DOX) from surface with pH and thermal triggers. The drug release profiles from the multilayer thin films with alterations of pH and temperature will been examined with UV-Vis Spectroscopy and Fluorescence Spectroscopy.

Keywords : temperature responsive polymers, h-bonded multilayer films, drug release, polyoxazoline
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