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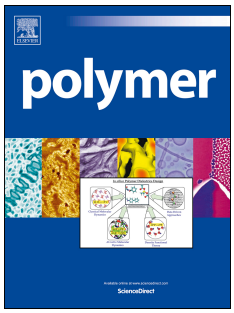

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Théophile Pelras, Hien T.T. Duong, Byung J. Kim, Brian S. Hawkett, Markus Müllner

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A 'Grafting from' Approach to Polymer Nanorods for pH-Triggered Intracellular Drug Delivery

Théophile Pelras,[a] Hien T.T. Duong,[a] Byung J. Kim,[a] Brian S. Hawkett,[a] and Markus Müllner*[a,b]

[a]*Key Centre for Polymers and Colloids, School of Chemistry, The University of Sydney, Sydney 2006, New South Wales, Australia.*

[b]*Australian Institute for Nanoscale Science and Technology, Sydney 2006, New South Wales, Australia.*

Email: markus.muellner@sydney.edu.au

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Cylindrical polymer brushes, ATRP, triggered drug release, doxorubicin, FLIM

ABSTRACT

We report the use of the 'grafting from' approach to produce inherently rod-shaped polymer nanoparticles with triggered drug release. Cylindrical polymer brushes (CPBs) can be directly used to yield functional polymer nanorods for pH-sensitive drug release of doxorubicin (DOX). Water-soluble CPBs have been produced via a straightforward one-step grafting of vinyl benzaldehyde (VBA) and poly(ethylene glycol) methyl ether methacrylate (PEGMA) comonomers, in which the VBA distributed throughout the CPBs provides a cost-effective and simple functionality for the subsequent conjugation of DOX using imine chemistry. Atomic force microscopy (AFM) underlined the rod-like conformation of the CPBs prior and after drug conjugation. Fluorescence spectroscopy studies revealed faster drug release in acidic environments (pH 5.0) compared to physiological pH conditions (pH 7.4). Fluorescence lifetime imaging (FLIM) and *in vitro* cell studies further highlighted the intracellular DOX release from the CPB drug carriers within MCF-7 breast cancer cells.