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# Mesoporous Silica Nanoparticles coated poly (styrene-co-maleic anhydride) thin film for drug delivery application

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## Abstract

Mesoporous silica nanoparticles (MSN) is known as one of the best material of nanotechnology for drug delivery application due to its unique properties along with biocompatibility and non-toxicity. However, the major challenge for nanomaterials is the release of drugs that could not be specified to target, thus reduced its efficiency. Since the cancer cell is more acidic than normal cell, an effort was made to incorporate the acidic responsive polymer to assist the performance of MSN. Thus, this study evaluate the potential of poly (styrene-co-maleic anhydride) (SMA) to coat the MSN pre-loaded with the model drug, quercetin (QT) in a thin film. The samples have been characterized for functional group, crystallinity, topography and morphology imaging, surface parameters and hydration analysis. The materials were fabricated within incorporation ratio of MSN/QT: polymer at 1:2,1:4, 1:6 and 1:8. The release performance of QT in neutral pH shows that MSN/QT released maximum rate of QT within 4 hours, while no release was observed from MSN/QT/SMA. Meanwhile in acidic pH, MSN/QT profile burst 50% release of drugs within 3 hours, while, the slow and sustain release was observed by MSN/QT/SMA until it reached 33.5% within 20 hours. This behavior was contributed to the morphology, solubility and chemical interaction between MSN/QT and the polymer. From this study, efficient encapsulation of polymer as carrier-drug molecules can be suggested as an alternative to the drug delivery application.

**Keywords:** mesoporous silica, polymer, pH-responsive, quercetin, drug delivery