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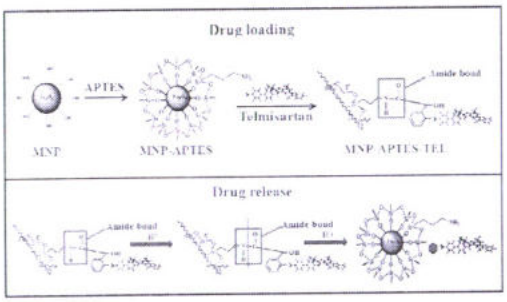
Monolayer grafting of aminosilane on magnetic nanoparticles: An efficient approach for targeted drug delivery system

R.P. Dhavale [a,1], P.P. Waifalkar [b,1], Apoorva Sharma [c,1], R.P. Dhavale [d], Subasa C. Sahoo [e], P. Kollu [f,g], A.D. Chougale [h], D.R.T. Zahn [c], G. Salvan [c], P.S. Patil [a,b], P.B. Patil [i,*]

[a] School of Nanoscience and Technology, Shivaji University, Kolhapur, Maharashtra 416004, India
[b] Department of Physics, Shivaji University, Kolhapur, Maharashtra 416004, India
[c] Institute of Physics, Chemnitz University of Technology, 09107 Chemnitz, Germany
[d] Department of Pharmaceutics, Bharati Vidyapeeth College of Pharmacy, Kolhapur, Maharashtra 416013, India
[e] Department of Physics, Central University of Kerala, Kasaragod, Kerala 671314, India
[f] CASEST, School of Physics, University of Hyderabad, Gachibowli, Hyderabad, Telangana 500046, India
[g] Thin Film Magnetism Group, Cavendish Laboratory, Department of Physics, University of Cambridge, Cambridge CB3 0HE, UK
[h] Department of Chemistry, The New College, Shivaji University, Kolhapur, Maharashtra 416012, India
[i] Department of Physics, The New College, Shivaji University, Kolhapur, Maharashtra 416012, India

GRAPHICAL ABSTRACT



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ABSTRACT

Magnetic nanoparticles (MNPs) with higher magnetization are highly desirable for targeted drug delivery (TDD) systems, as it helps accumulation of drug at the target site. However, functionalization of MNPs for drug binding reduces the magnetization which affects the efficacy of TDD. Herein we report direct functionalization of MNPs with (3-Aminopropyl)triethoxysilane (APTES) which preserves the magnetization. Grafting density estimated by TGA and BET analysis showed monolayer grafting of APTES on MNP surface. MNPs were comprehensively characterized by XRD, HR-TEM, SQUID-VSM and FTIR. Anticancerous drug telmisartan (TEL) was loaded on monolayer APTES grafted MNPs. In-vitro controlled drug release and cytotoxicity study on PC-3 human prostate cancer cell line of TEL conjugated MNPs are also discussed. This functionalization strategy can be extended to other biomedical applications where higher magnetization is desired.

* Corresponding author.
E-mail address: prashantphy@gmail.com (P.B. Patil).
[1] These authors have equal contributions.

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