applied sciences

MDPI

Supplementary material

Functionalized mesoporous silica nanoparticles as Delivery Systems for Doxorubicin: Drug loading and Release

Candace M. Day [1], Martin J. Sweetman [1,2], Yunmei Song [1], Sally E. Plush [1,2*], Sanjay Garg [1,2*]

[1] University of South Australia: Clinical and Health Sciences, North Terrace, Adelaide SA 5000;
Candace.Day@mymail.unisa.edu.au, Martin.Sweetman@unisa.edu.edu.au, May.Song@unisa.edu.au, Sally.Plush@unisa.edu.au, Sanjay.Garg@unisa.edu.au.
[2] Future Industry Institute, University of South Australia, Mawson Lakes SA 5095.
* Correspondence: Sally.Plush@unisa.edu.au; Tel.: +61-8-8302-2586;
Sanjay.Garg@unisa.edu.au; Tel.: +61-8-8302-1575

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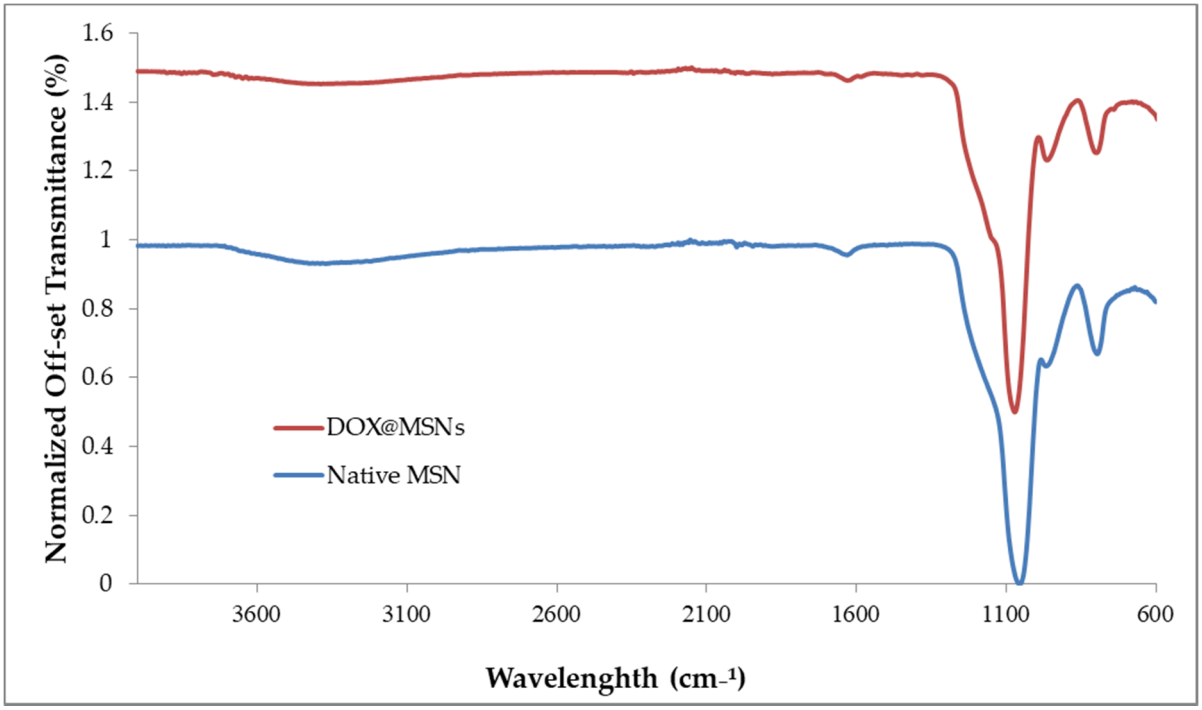

Figure S1. FT-IR spectrum of DOX@MSNs vs unloaded native MSNs

DOX-loaded sample demonstrated no additional peak compared to native MSNs, indicating a very low presence of loaded DOX.

E1. Synthesis of DOX@MSN-PLH using pre-surface grafting loading method

To conduct this experiment, our previously published procedure was used to fabricate MSN-PLH was employed, with modification. DOX@MSNs (30 mg) were dispersed in anhydrous PhMe (5 ml) and ultrasonicated for 10 min. The solution was then heated to 110 ˚C, and MPTES (30 µL) was added. The solution was stirred vigorously under an N_2 atmosphere and protected from light overnight. The red solid DOX@MSN-SH was collected by centrifugation (12,000 RPM, 20 min, 24 ˚C); and washed extensively with anhydrous PhMe (5 ml × 3). Obtained DOX@MSN-SH particles were then dispersed in PBS buffer pH 5 and ultrasonicated for 10 min. To this aqueous solution was added Mal-PLH-NH_2 (20 mg), and the reaction was stirred under an N_2 atmosphere for 24 h at room temperature. The desired red solid DOX@MSN-PLH was then collected by centrifugation (12,000 RPM, 20 min, 24 ˚C) and left to dry under vacuum in a desiccator until fully dried. The FT-IR spectrum of resulting DOX@MSN-PLH compared to unloaded MSN-PLH was demonstrated in Fig S2.

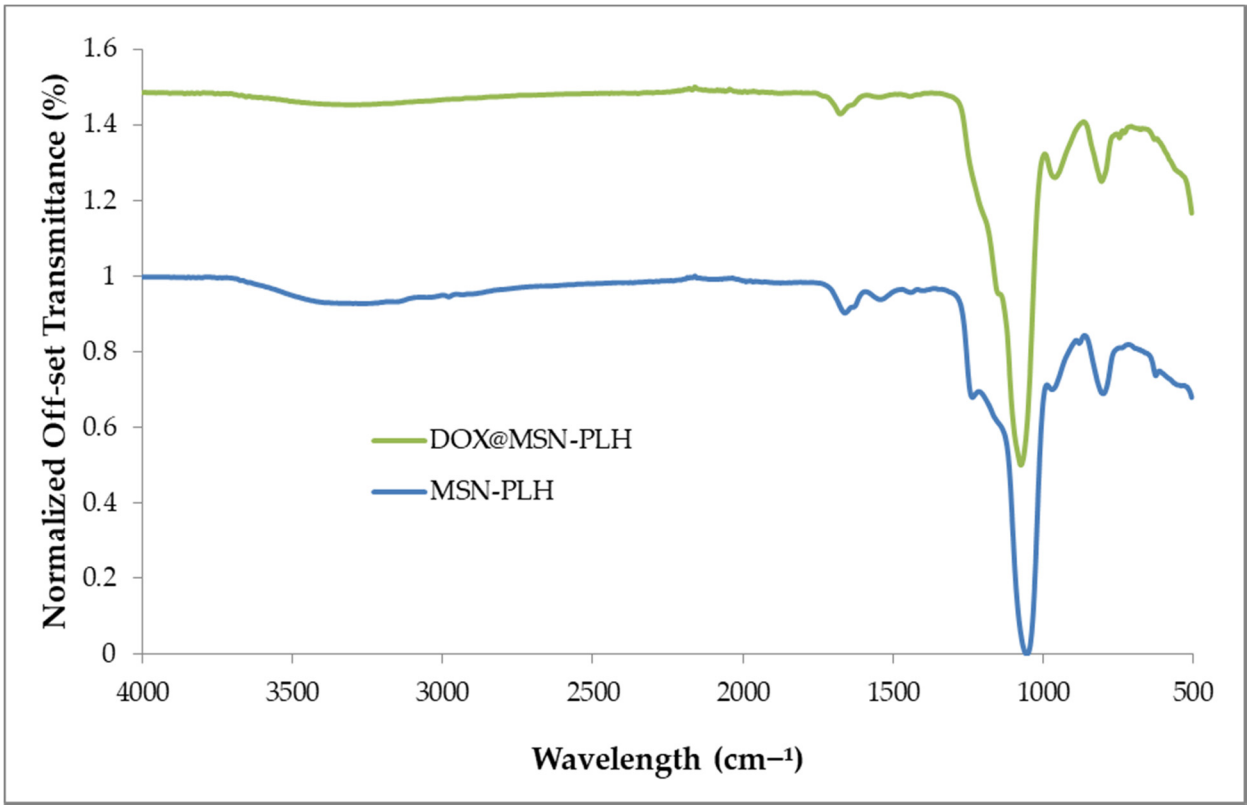

Figure S2. FT-IR spectrum of DOX@MSN-PLH vs unloaded MSN-PLH

DOX-loaded sample demonstrated no additional peak compared to native MSNs, indicating a very low presence of loaded DOX.

E2. Synthesis of DOX@MSN-PLH-TAM using pre-surface grafting loading method

DOX@MSN-PLH (33 mg) was ultrasonically dispersed in anhydrous CH_3CN (3.5 mL) before a solution of TAM-TEG-OMs (33 mg, 0.054 mmol, prepared in-house) [1] in CH_3CN (1 ml) was added. The suspension was stirred at 80 ˚C for 24 h. The resulting red precipitate DOX@MSN-PLH-TAM was collected using centrifugation (12,000 RPM, 15 min) and washed extensively with CH_3CN (5 ml × 3). The solid was collected and left to dry under vacuum in a desiccator until fully dried.

[1] Day, C.M.; Sweetman, M.J.; Hickey, S.M.; Song, Y.; Liu, Y.; Zhang, N.; Plush, S.E.; Garg, S. Concept Design, Development and Preliminary Physical and Chemical Characterization of Tamoxifen-Guided-Mesoporous Silica Nanoparticles. *Molecules* **2021**, 26, 219.