PNAS

Supporting Information for

Biolistic Delivery of MOF-Protected Liposomes

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- Figures S1 to S10
- Table S1
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Figure S1.

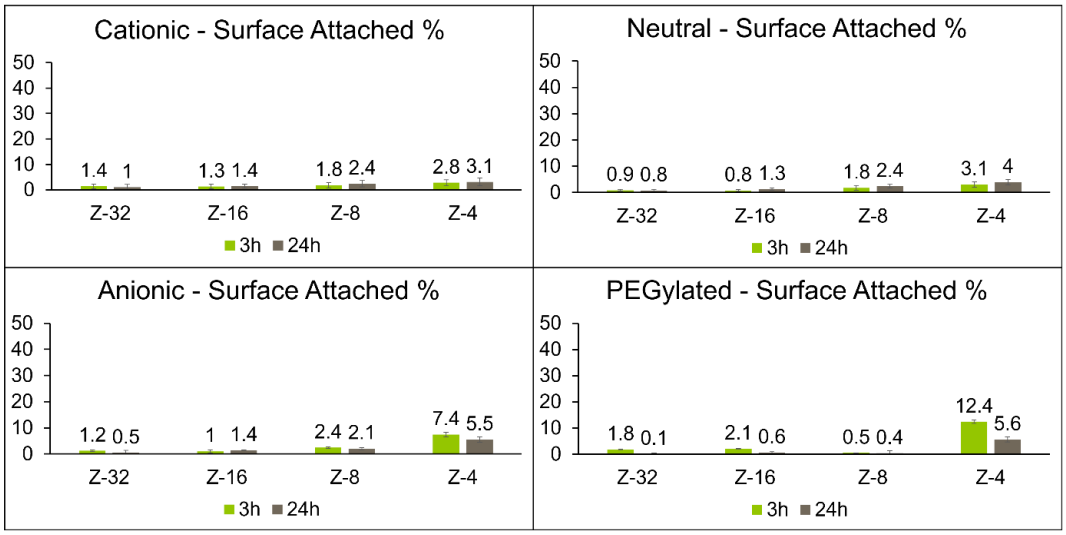

Figure S1: Quantification of liposomes attached to the exterior surface of ZIF-8 electrostatically for various lipid formulations, L/M ratios and encapsulation times. Y-axis denotes percent of total liposomes that were found to be surface attached. X-axis of each graph denote various Lip@Z formulations. Error bars represent ± SD.

Movie S1.

(File attached)

Movie S1: Video showing the first five minutes of ZIF-8 and Lip@Z synthesis. Synthesis is carried out as described in the Table 1. The ZIF-8 vial had water and 2-methylimidazole, and the Lip@Z vial had liposomes, water and 2-methylimidazole added prior to recording. Zinc acetate was added via a pipette and reaction was allowed to proceed without disturbance.

Figure S2.

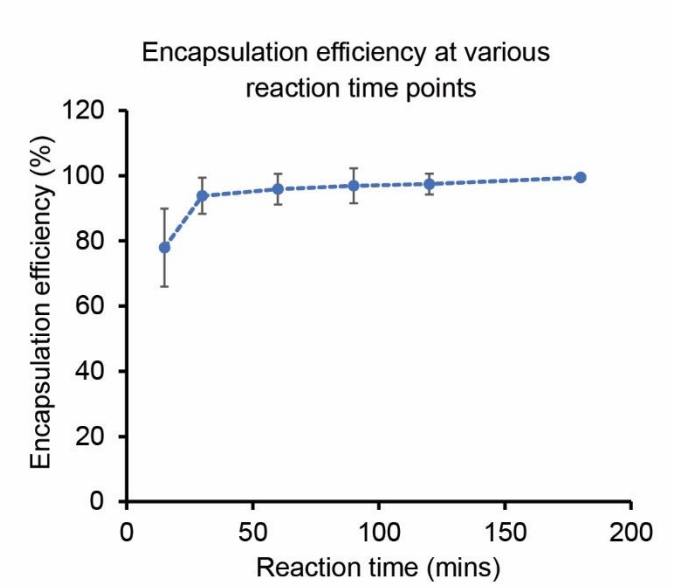

Figure S2: Encapsulation efficiency of Neu@Z-32 after 15 min, 30 min, 1 h, 1.5 h, 2 h and 3 h. Y-axis denotes the encapsulation efficiency in percentage. X-axis denotes reaction time in minutes. Error bars represent ± SD.

Figure S3.

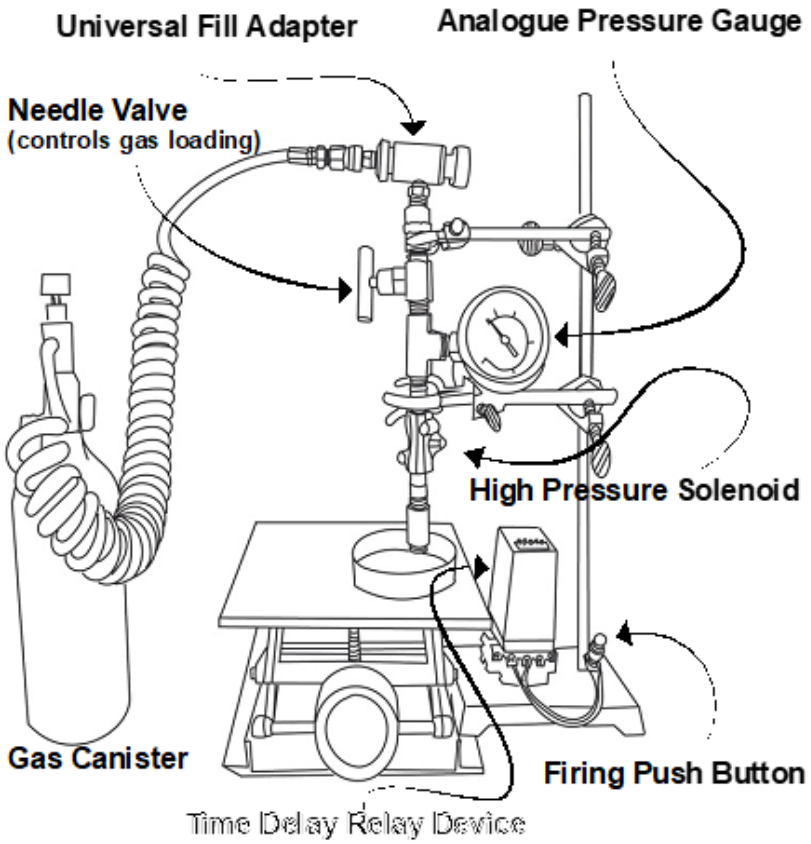

Figure S3: Illustration of the MOF-Jet built in-house.

Figure S4.

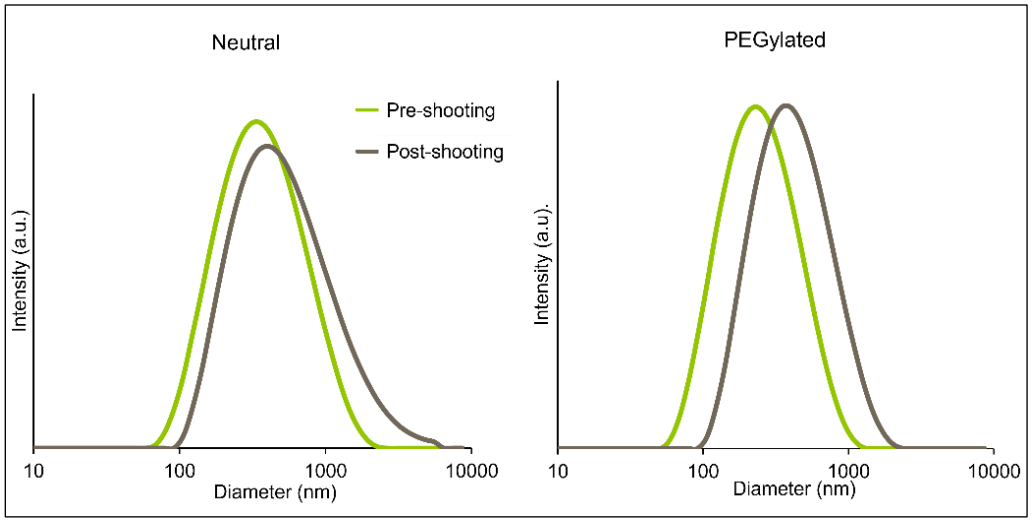

Figure S4: DLS graphs of neutral and PEGylated formulation liposomes before and after being delivered by the MOF-Jet.

Figure S5.

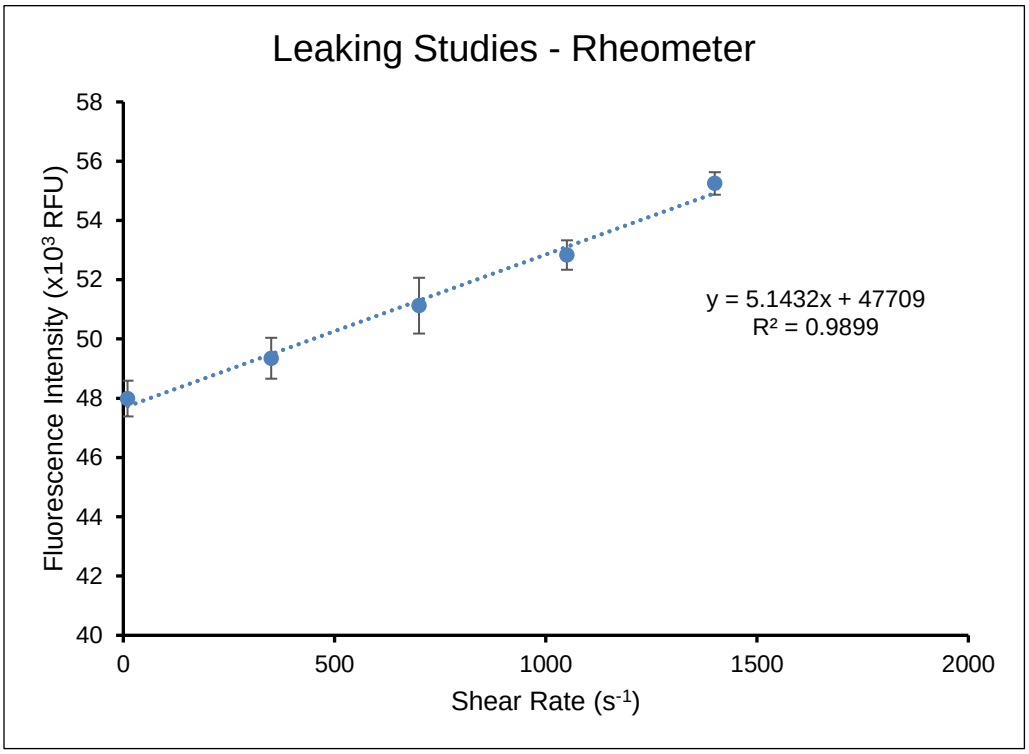

Figure S5: Graph depicting the linear relationship between fluorescence from leaking of CF dye and the shear rate at which the liposomes were stressed using a rheometer. Error bars represent ± SD.

Table S1.

MOF-Jet pressure (PSI)	MOF-Jet pressure (kPa)	Shear rate (s^{-1})
200	1379	1208.46
400	2758	2034.53
600	4137	3315.51

Table S1: Shear stress experienced by delivered material at varying pressures of the MOF-Jet. The calculation was carried out by equating leaking of CF-filled liposomes when stressed by rheometer to that of the MOF-Jet.

Fig. S6.

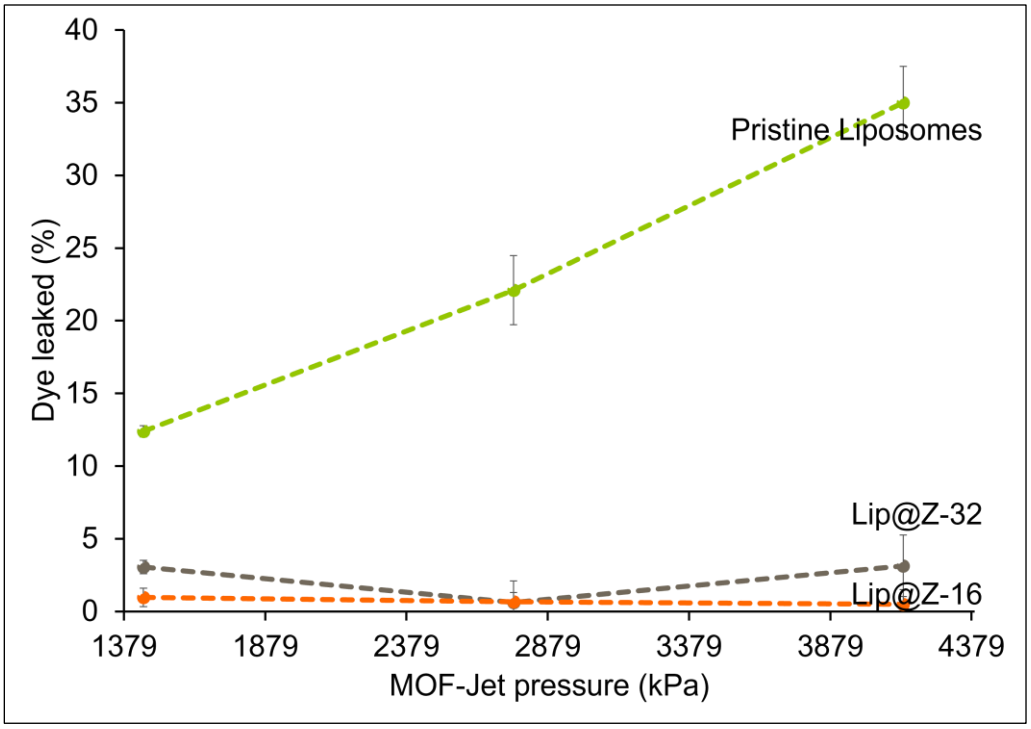

Fig S6: Quantification of dye leaking of pristine unencapsulated CF-filled liposomes, Lip@Z-32 and Lip@Z-16 at varying MOF-Jet pressures. Error bars represent ± SD.

Fig. S7.

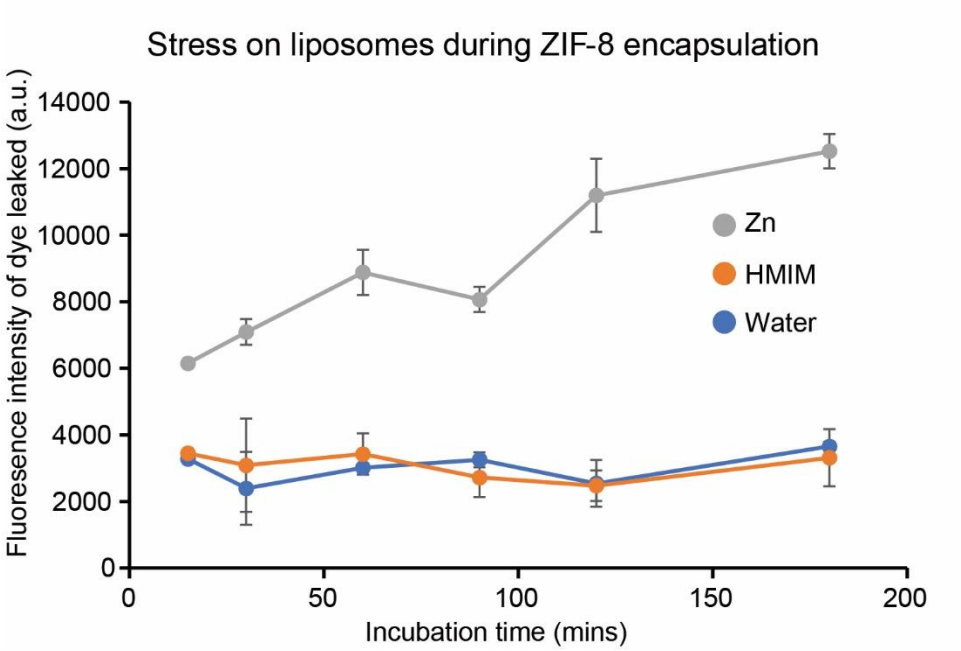

Fig S7: Quantification of fluorescence in the supernatant from CF dye leaked from liposomes upon incubation with Zn, HMIM and water. Y-axis is fluorescence intensity in a.u., X-axis is incubation time in mins. Error bars represent ± SD.

Fig. S8.

Fig S8: Gel cross-section of Cy5@Lip when delivered into agarose gel.

Fig. S9.

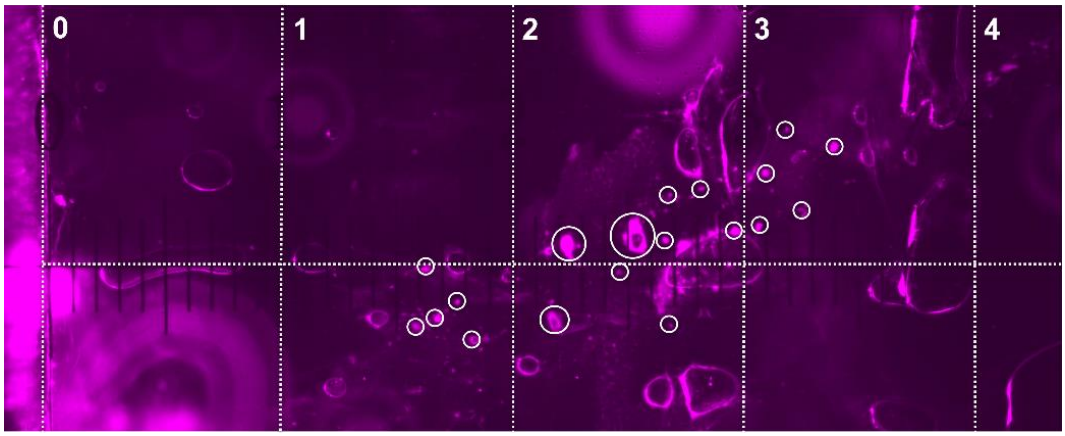

Fig S9: Gel cross-section of Cy5@Lip@Z when delivered into agarose gel.

Fig. S10.

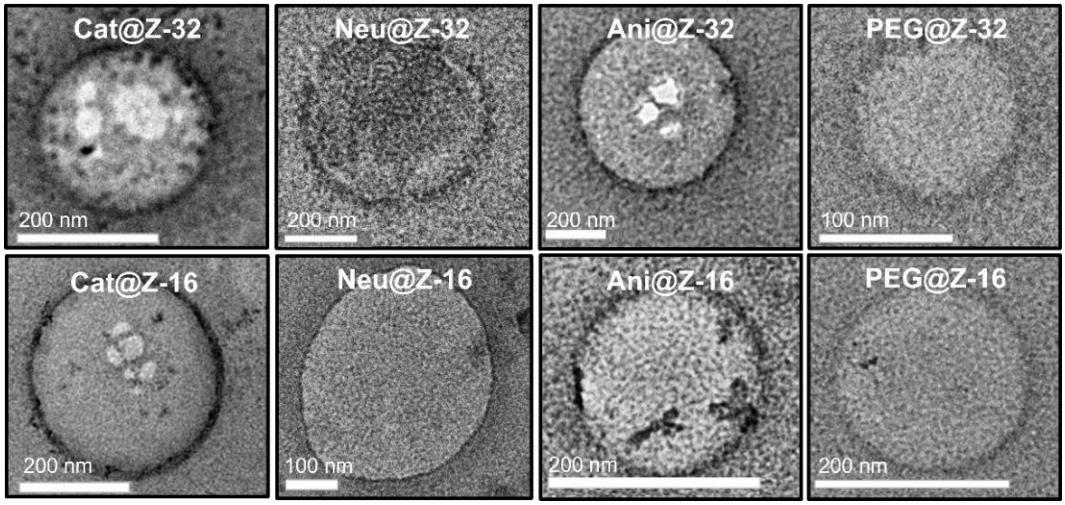

Fig S10: TEM images of various Lip@Z formulations after removal of the ZIF-8 coating via exfoliation using 0.5M EDTA.