

Supplementary information

Supplementary 1

Determination of weight content of HMS-301 in the microcapsule by ^1H NMR

According to the information provided by the manufacturer, the HMS-301 has a molecular weight of 2,000g/mol and an average chain length of 28 Si atoms. Eight of these are CH_3HSiO groups. Meanwhile, the PMMA used in the experiment has a molecular weight of 15,000g/mol, consisted of 150 repeating units of $-(\text{CH}_2\text{C}(\text{CH}_3)(\text{COOCH}_3)-)$. Hence, each PMMA molecule contains 450 protons from the methyl ester group. The mol ratio between HMS-301 and PMMA can be obtained by calculating the ratio between 450 times the area of hydride group of the signals at $\delta=4.7\text{ppm}$ and eight times the area of methyl groups of the signals at $\delta=3.6\text{ppm}$ by means of the following equation³⁰:

$$\frac{n_{\text{HMS-301}}}{n_{\text{PMMA}}} = \frac{450 \cdot A_1}{8 \cdot A_2}$$

where A_1 is area of the signal due to eight protons of the hydride groups in each HMS-301 molecule, A_2 is area of the signal due to 450 protons of the methyl groups in each PMMA molecule. Thus, the weight fraction of HMS-301 in the microcapsule can be obtained by the following equation:

$$\% \text{HMS-301}(\text{wt}) = \frac{\frac{450 \cdot A_1}{8 \cdot A_2} \cdot M_{w_{\text{HMS-301}}}}{\frac{450 \cdot A_1}{8 \cdot A_2} \cdot M_{w_{\text{HMS-301}}} + M_{w_{\text{PMMA}}}}$$

where $M_{w_{\text{HMS-301}}}$ and $M_{w_{\text{PMMA}}}$ are the molecular weight of HMS-301 and PMMA, respectively

Supplementary 2

Rheological behaviours PMMA/HMS-301 microcapsule+V35 (Figure S2a), HMS-301+empty PMMA capsule+V35 (Figure S2b) and HMS-301+V35 (Figure S2c) from time sweep rheological measurement. All the measurements were performed with a strain of 2% and a frequency of 1Hz.

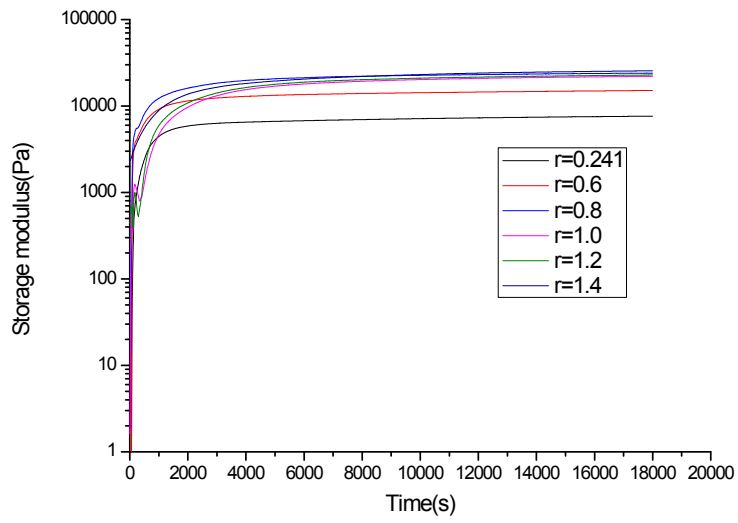


Figure S2a. Evolution of storage modulus of mixture containing PMMA/HMS-301 microcapsule+V35 at 120 °C in a period of 5h.

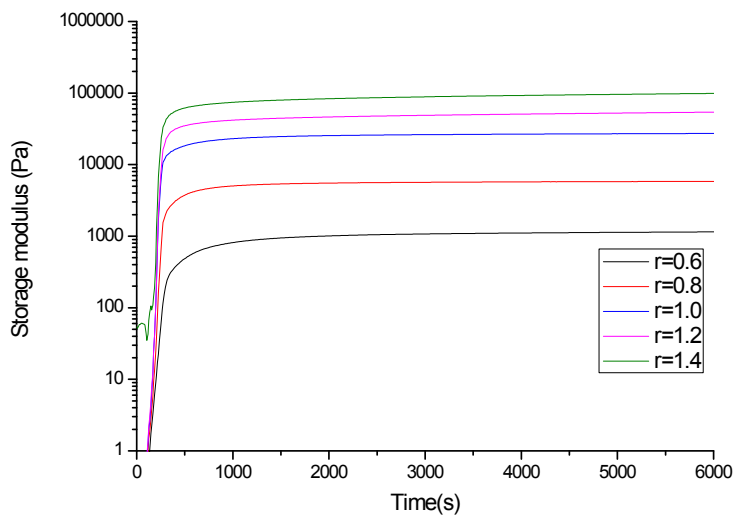


Figure S2b. Evolution of storage modulus of mixture containing HMS-301+empty PMMA capsule+V35 at 120 °C in a period of 2h.

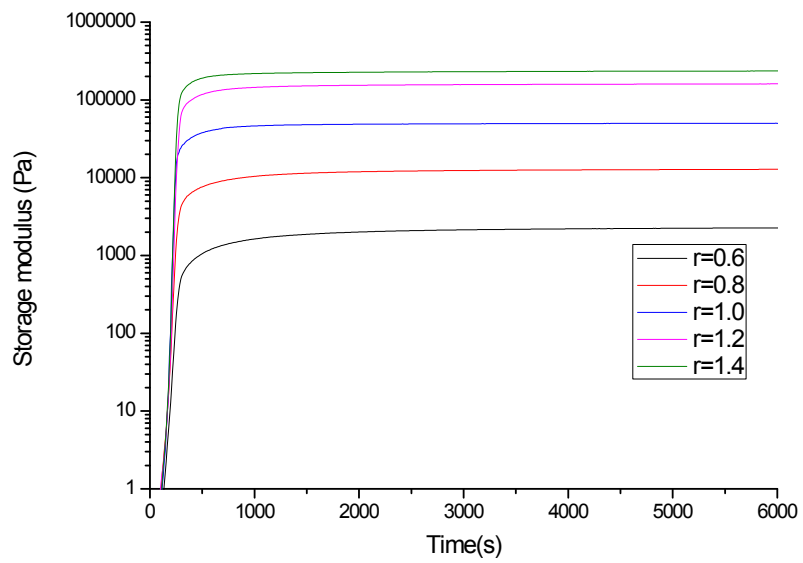


Figure S2c. Evolution of storage modulus of mixture containing HMS-301+V35 at 120°C in a period of 2h.