Electronic Supplementary Information

Self-healing of thermally molded commodity plastics based on heat-resistant and anti-aging healing systems

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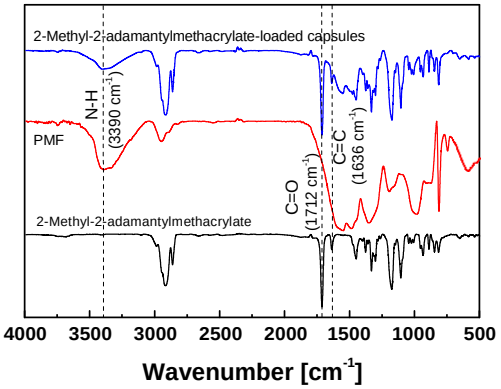
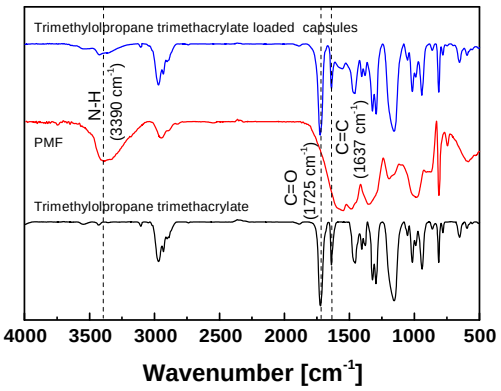


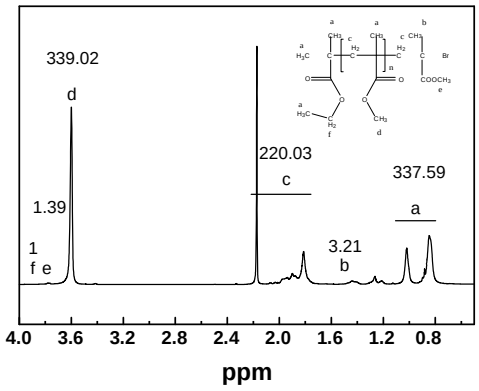
(a)



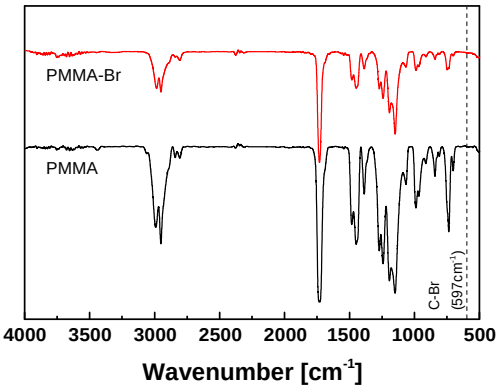
(b)

Fig. S1 (a) FTIR spectrum of 2-methyl-2-adamantylmethacrylate-loaded

microcapsules in comparison with those of PMF shell and pure 2-methyl-2-adamantylmethacrylate. (b) FTIR spectrum of trimethylolpropane trimethacrylate-loaded microcapsules in comparison with those of PMF shell and pure trimethylolpropane trimethacrylate.



(a)



(b)

Fig. S2 (a) ^{1}H NMR and (b) FTIR spectra of the macroinitiator PMMA-Br. The numerals shown in (a) are the integrations of the peaks.

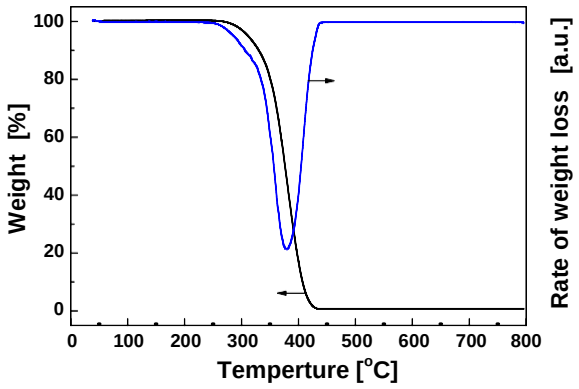
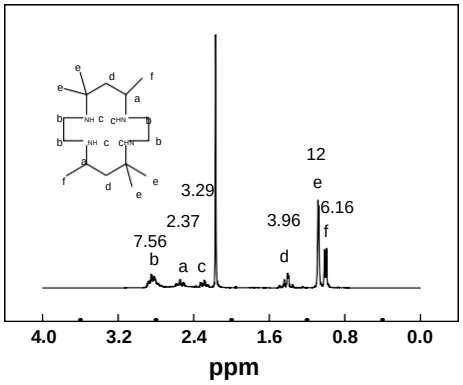
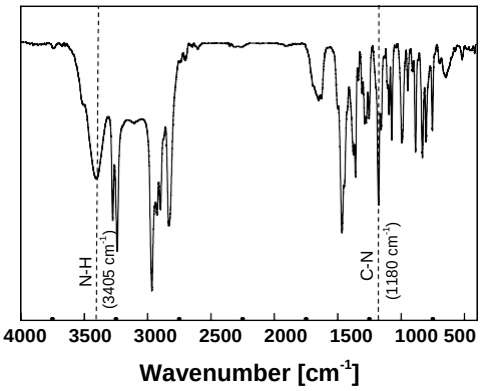


Fig. S3 Thermal decomposition behavior of the macroinitiator PMMA-Br.



(a)



(b)

Fig. S4 (a) ^{1}H NMR and (b) FTIR spectra of the ligand Me_6[14]aneN_4. The numerals shown in (a) are the integrations of the peaks.

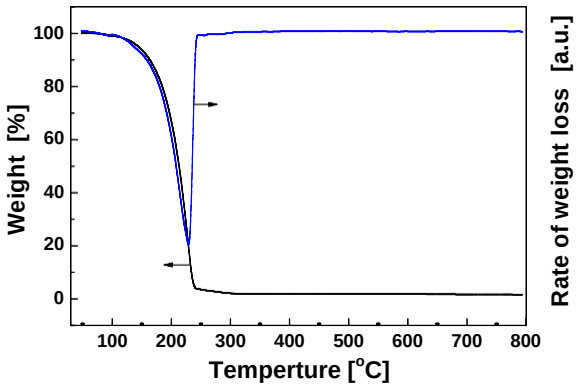


Fig. S5 Thermal decomposition behavior of the ligand Me_6[14]aneN_4.

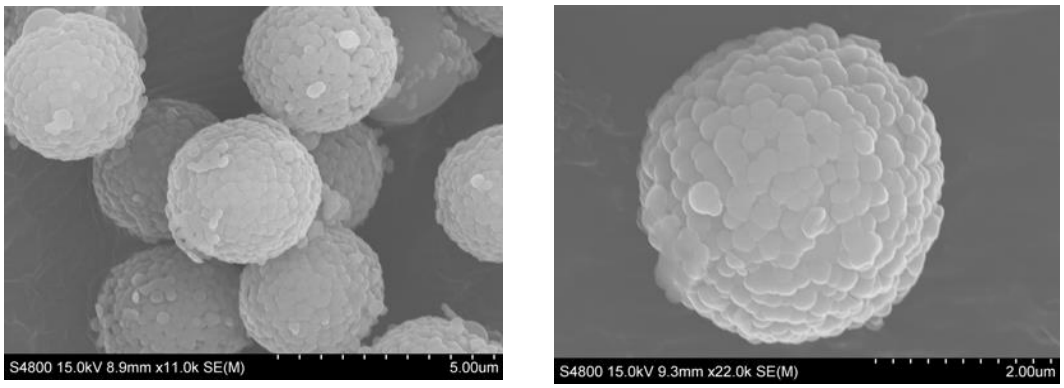
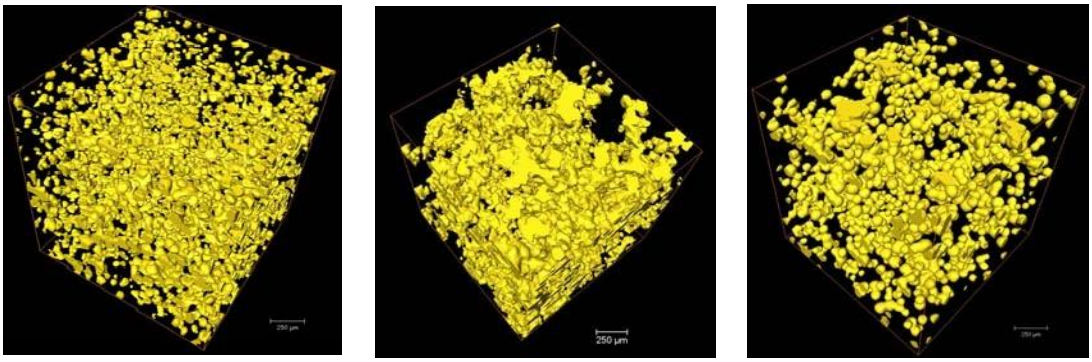


Fig. S6 Scanning electron microscopic (SEM) photos of SiO_2 coated PS-MMA particles carrying the coordination compound of Me_6[14]aneN_4 and CuBr.



(a) (b) (c)

Fig. S7 3D distribution of healing capsules in (a) PS, (b) PMMA and (c) ABS based composites. Content of 2-methyl-2-adamantylmethacrylate-loaded microcapsules in

PS composite: 15 wt%. Contents of trimethylolpropane trimethacrylate-loaded microcapsules in PMMA and ABS composites: 15 wt%.

(a) (b) (c) (d)

Fig. S8 Photos of trimethylolpropane trimethacrylate (a, b) in liquid state at room temperature and (c, d) in solid state after being heated to 170 °C for 45 min in the presence of air. The results demonstrate that auto-polymerization must have taken place.

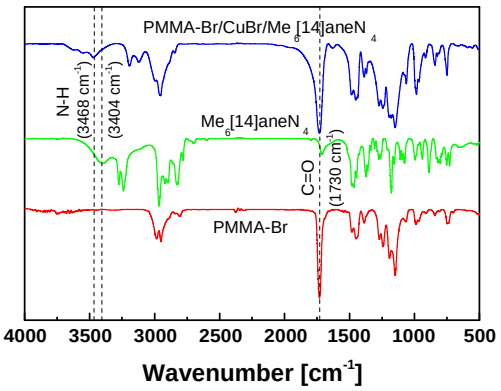


Fig. S9 FTIR spectrum of PMMA-Br particles carrying the coordination compound of the ligand and cuprous bromide in comparison with those of the ligand and PMMA-Br.

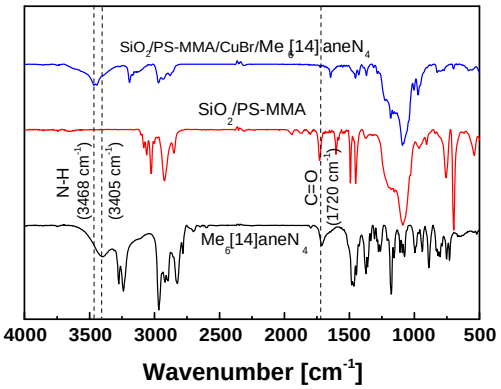


Fig. S10 FTIR spectrum of silicon dioxide coated PS-MMA microparticles carrying the coordination compound of $Me_6[14]aneN_4$ and cuprous bromide in comparison with those of the ligand and silicon dioxide coated PS-MMA microparticles.

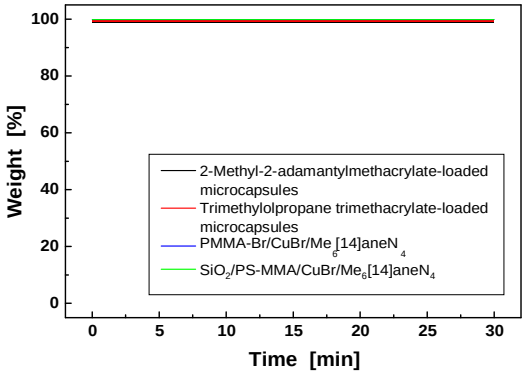


Fig. S11 Time dependences of weight of 2-methyl-2-adamantylmethacrylate-loaded microcapsules, trimethylolpropane trimethacrylate-loaded microcapsules, PMMA-Br particles carrying the coordination compound of $Me_6[14]aneN_4$ and cuprous bromide, and silicon dioxide coated PS-MMA microparticles carrying the coordination compound of $Me_6[14]aneN_4$ and cuprous bromide. Testing atmosphere: oxygen. Heating rate: 10 °C/min.