

ESI

Amino-functionalized Breath-Figure cavities in Polystyrene-Alumina hybrid Films : Effect of particle concentration and dispersion

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SEM and XRD of alumina particles

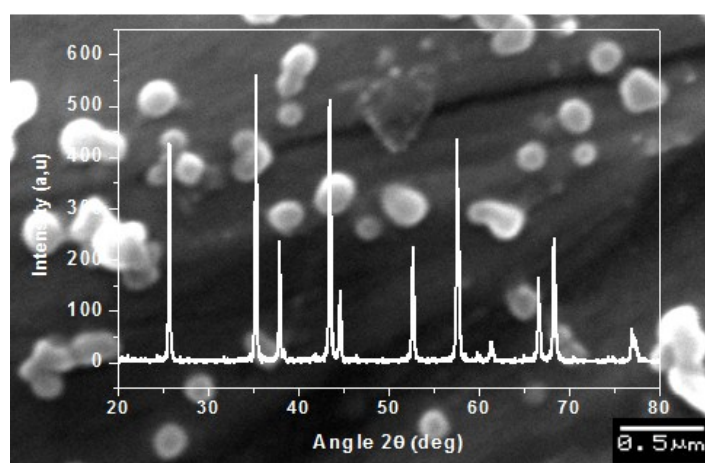


Figure S1

FT-IR Spectroscopy

FT-IR spectra were taken from Perkin Elmer Series FT-IR Spectrometer 2.

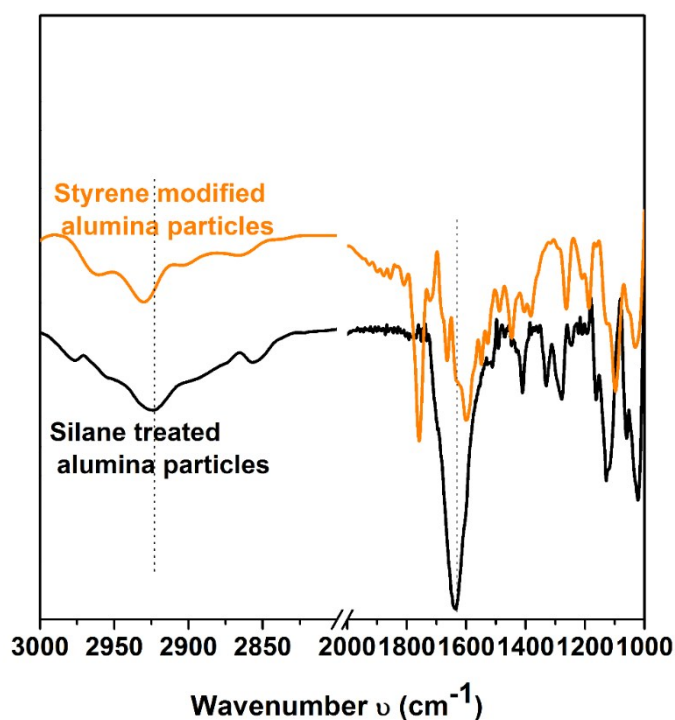


Figure S2 FT-IR spectra of silane modified particles and styrene polymerised particles. Silane modified particles showed absorption bands at 2925, 2855 and 1524 cm^{-1} due to the aminopropyl group and at 1641 cm^{-1} due to the vinyl group. The presence of Si-O-Si stretching band at 1130 cm^{-1} suggested the presence of oligomeric siloxanes linkage which were formed by inter-condensation of hydrolysed silane molecules. Peak intensity of -C=CH decreased in polymerized particles due to the involvement of vinyl group in polymerization. The red shift of peaks corresponds to propyl group is attributed to the chain strain experienced due to the polymer chain and the intensity of the corresponding peak increased in polymerized particle because of the large amount of $\text{-CH}_2\text{-}$ chain.

Thermogravimetry

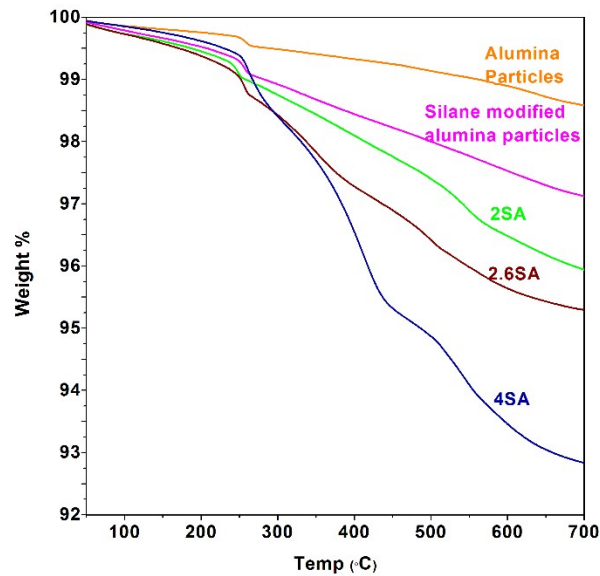


Figure S3: TGA analysis of alumina particles (A), silane treated alumina, styrene modified alumina particles (2SA, 2.6SA, 4SA)

Loss in Bare alumina = 1.11%
 Loss in silane modified alumina = 2.86%
 Total % of silane content = 2.86-1.11= 1.75%
 Molar ratio of AS:VS= 1:1,

AS Mol wt= 221.37g
 VS mol wt = 190.31

221.37 : 190.3
 =1.16 : 1

%loss of AS = 1.75*(1.16/2.16)=0.939%
 % loss of VS = 1.75*(1/2.16)=0.810 %

PS content for styrene to alumina ratio 0.07 = 1.2%
 PS content for styrene to alumina ratio 0.09 = 1.8%
 PS content for styrene to alumina ratio 0.1 = 3.2%

Total hydrophobic content .i.e. vinyl +polystyrene

For 2S system = 0.810+1.2 =2.01% hydrophobic/hydrophilic ratio = 2: 0.94 2:1
 For 2.6S system = 0.810+1.8 = 2.61% hydrophobic/hydrophilic ratio = 2.6: 0.94 2.6:1
 For 4S system = 0.810+3.2=4.01% hydrophobic/hydrophilic ratio = 4:.94 4:1

Microstructure

Optical images were taken using Leica optical Microscope

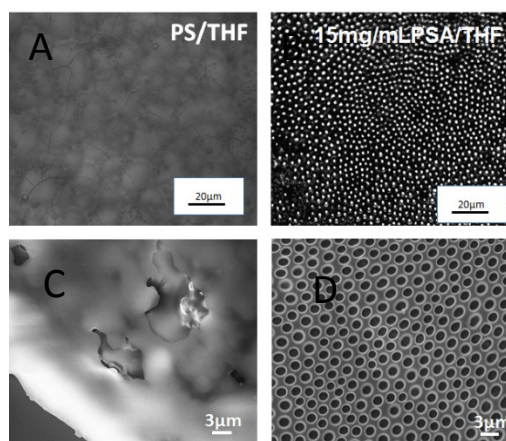


Figure S3: (A) Optical transmittance and (C) SEM images of drop cast film of PS/THF solution. (B) optical transmittance and (D) SEM image of drop cast film of 15mg/mL PSA/THF solution.

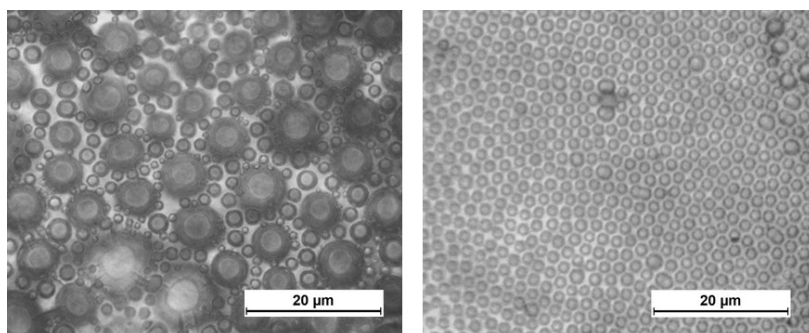


Figure S4: Optical Reflectance Image of drop cast film of (a) PS/CHCl₃ (b) PSA/CHCl₃ solution

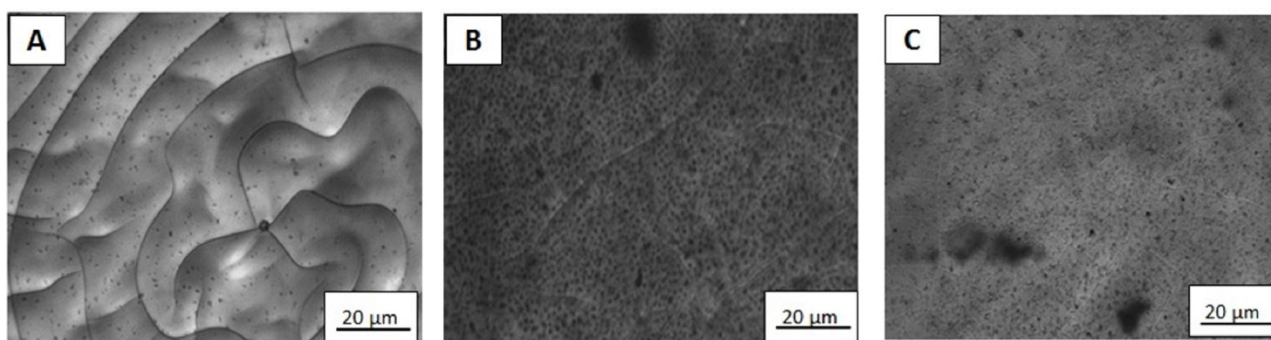


Figure S6 Optical images of ninhydrin-treated non-patterned films of (A) P2(2SA) (B) P3(2SA) (C) P5(2SA) from THF showing distribution of alumina particles in the surface layer. The dark spots are due to reaction product of ninhydrin with amino groups of the particles.