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Article:

Ettelaie, R and Murray, BS (2015) Evolution of bubble size distribution in particle stabilised bubble dispersions: Competition between particle adsorption and dissolution kinetics. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 475. 27 - 36. ISSN 0927-7757

<https://doi.org/10.1016/j.colsurfa.2014.10.005>

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Figure Captions

Fig. 1. The evolution of bubble size distribution function in a system originally containing 40% v/v of gas. The initial average bubble radius is 3.5 μm and bubbles were stabilised by nanoparticles of size 7 nm with an initial concentration of 0.04%. Different curves show the distribution function at different times; $t=0$ (short dashed), $t=0.5$ (dash-dotted), $t=1.0$ (long dashed) and once all bubbles are fully stabilised (solid line). The time is expressed in units of $\tau \langle R(0) \rangle^3$.

Fig. 2. The average size (a) and standard deviation (b) of bubbles plotted as a function of time for three different systems containing different amount of nanoparticles, 0.04% v/v (dash-dotted), 0.02% v/v (dashed) and 0.01% v/v (solid). The initial bubble size distribution is that shown in Fig. 1, with a bubble volume fraction of 40%. The inset in (b) shows the variation of the relative width of the distribution with time for each system.

Fig. 3. The average size (a) and standard deviation (b) of bubbles plotted as a function of time for three different systems containing different initial volume fraction of gas bubbles 2% (solid line), 10% (dash-dotted line), 40% (dashed line). The initial bubble size distribution was the same as that shown in Fig. 1, but with $\langle R(0) \rangle = 7 \mu\text{m}$. The concentration of stabilising nanoparticles was 0.01% v/v and their size 7 nm, in all cases.

Fig. 4. The value of the radius below which the bubbles are no longer shrinking, plotted as a function of time, for each of the three systems in Fig. 3.

Fig. 5. The variation of the number of particles still remaining in the bulk solution, after a time t (in normalised units). The particle concentration is expressed as a fraction of its initial starting value. Each graph represents the same corresponding system as that in Fig. 3.

Fig. 6. Comparison of the final bubble size distributions, obtained for each of the three systems in Fig. 3 once all bubbles have been stabilised.

Fig. 7. Graph showing the variation of the final radius of the larger bubbles, plotted as a function of the fraction of gas initially in these bigger bubbles. Results are obtained for bimodal bubble size distribution functions in which the initial radii of large and small bubbles were set to 10.5 and 3.5 μm , respectively.

Fig. 8. The percentage of the retained gas for the same systems as those in Fig. 7, plotted against the initial fraction of gas which is contained in the larger bubbles.

Figure 1

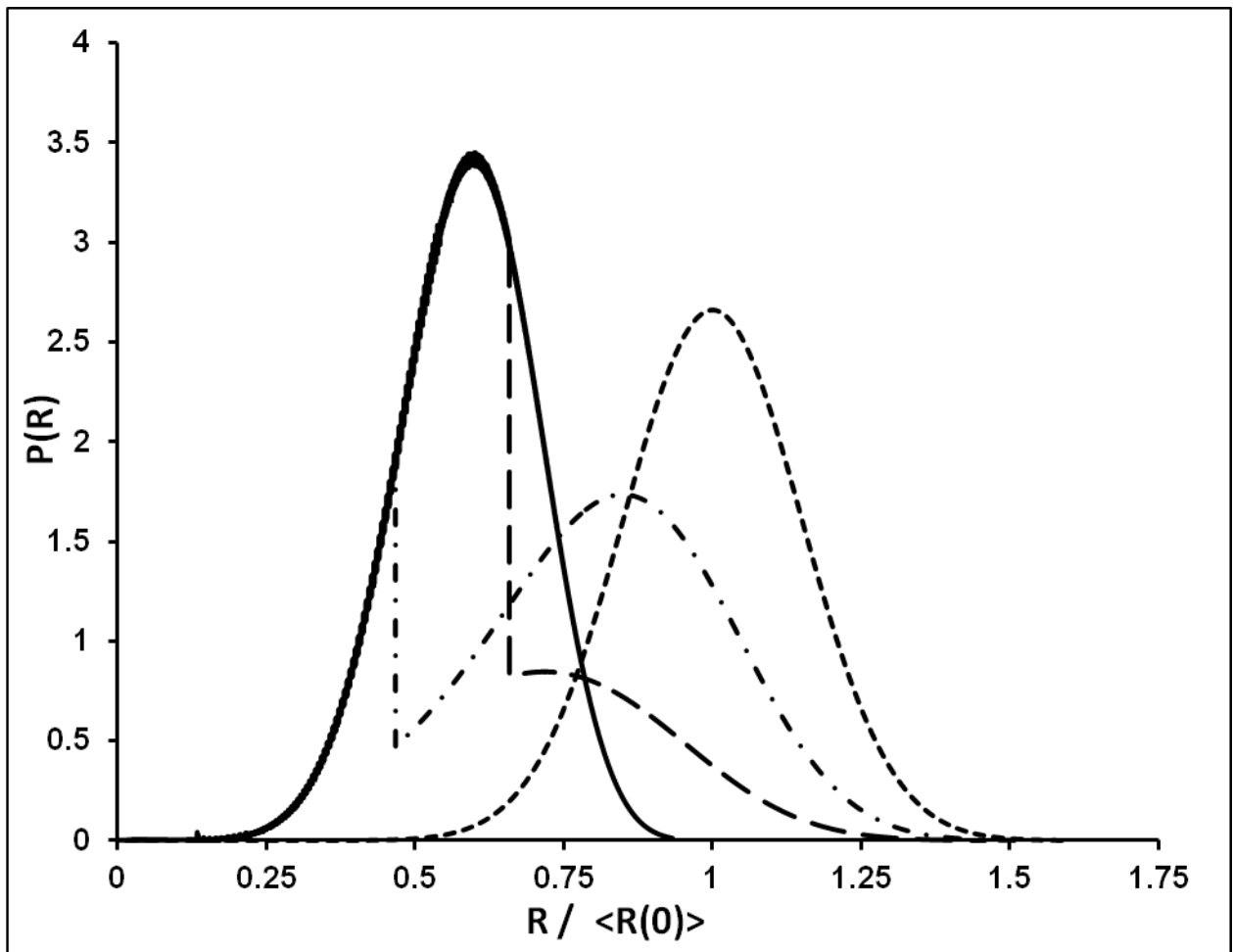


Figure 2a

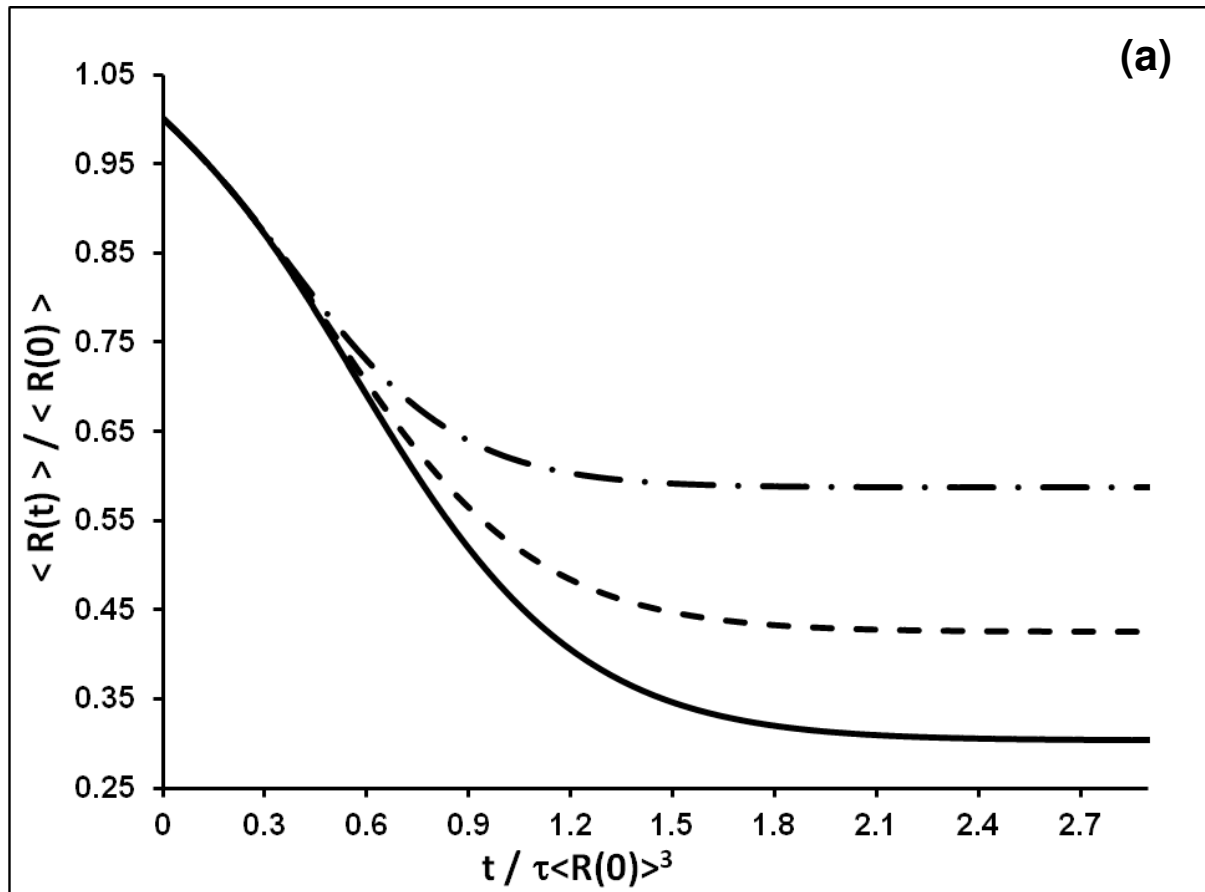


Figure 2b

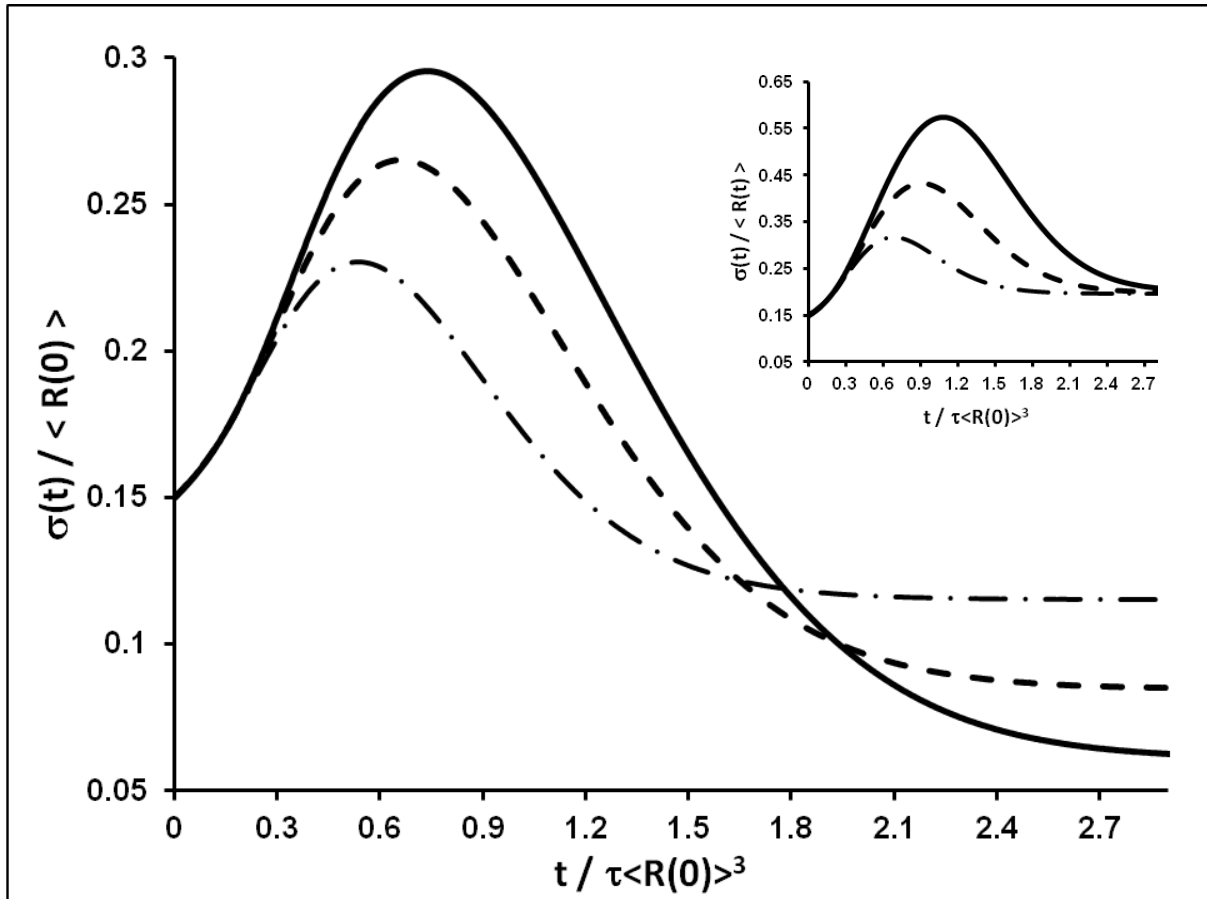


Figure 3a

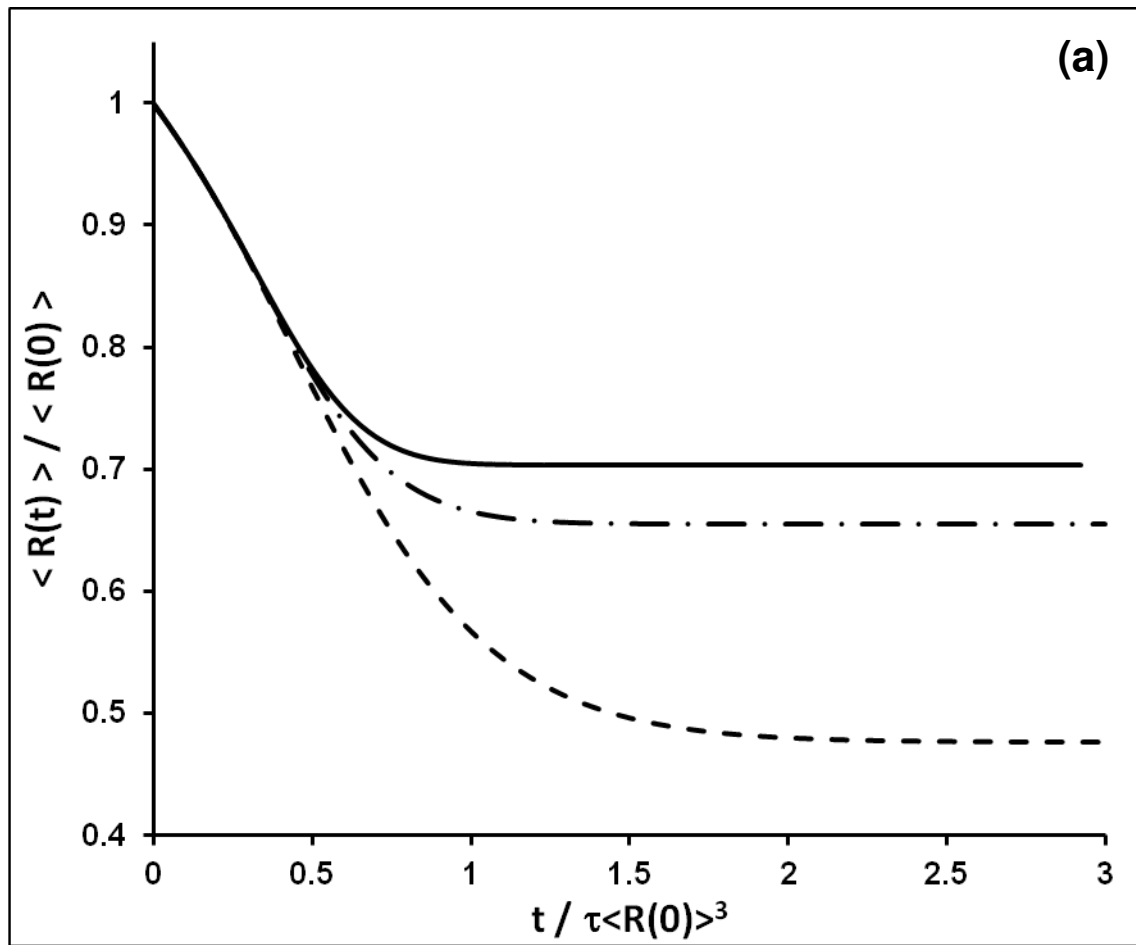


Figure 3b

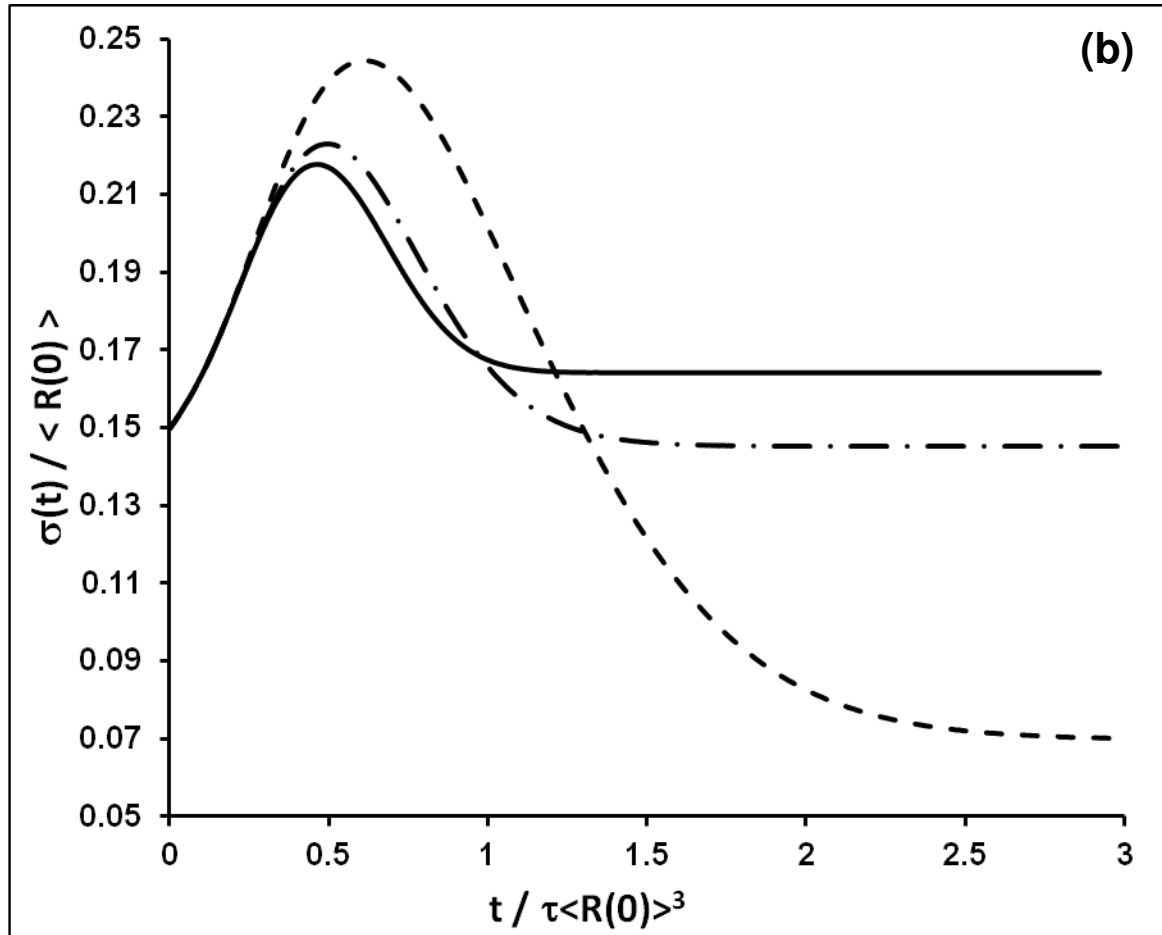


Figure 4

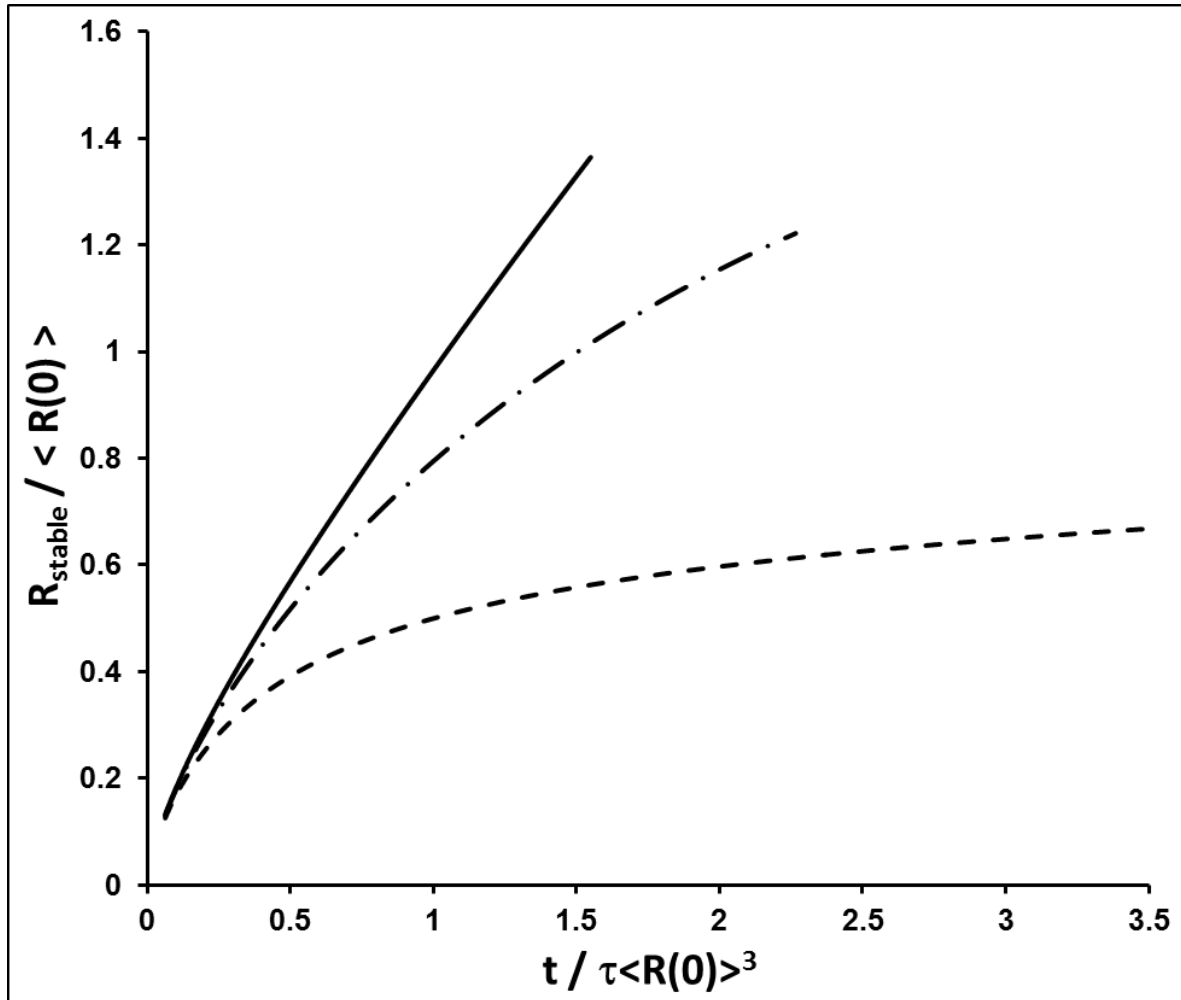


Figure 5

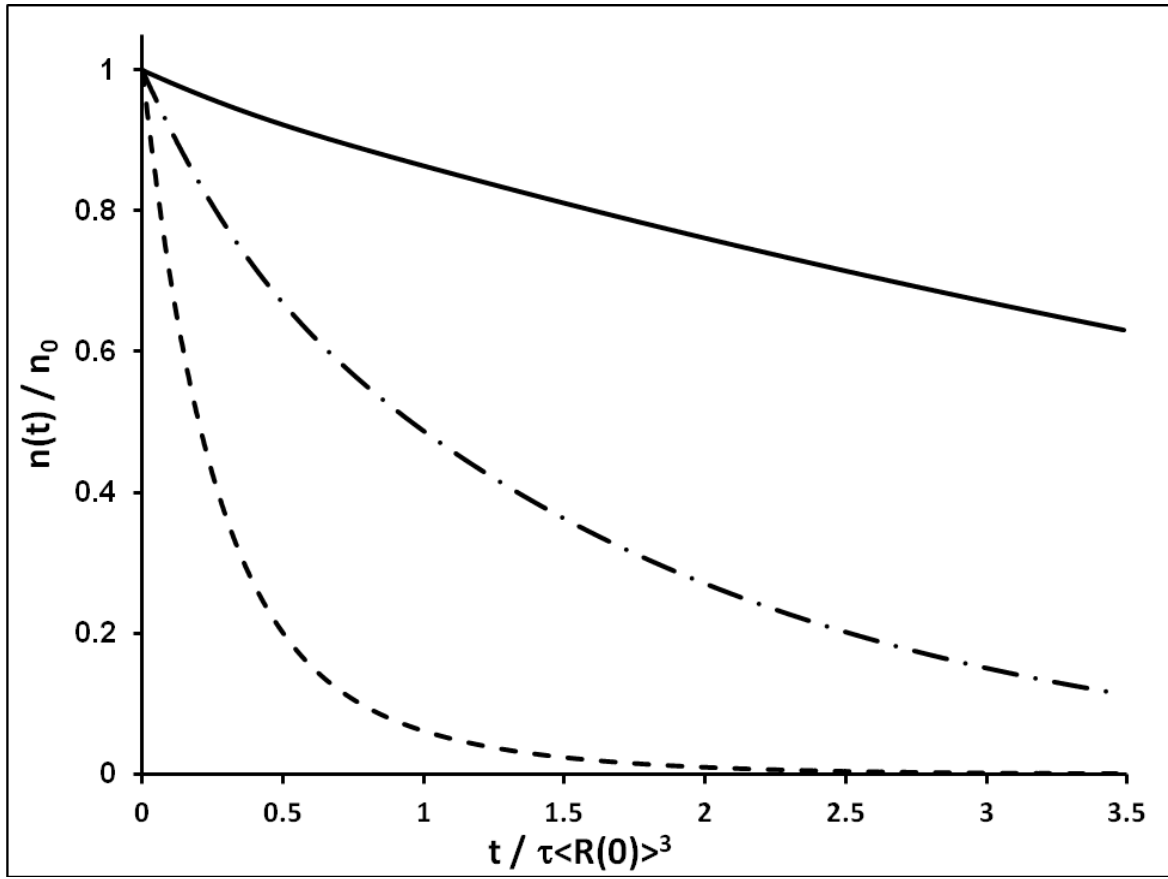


Figure 6

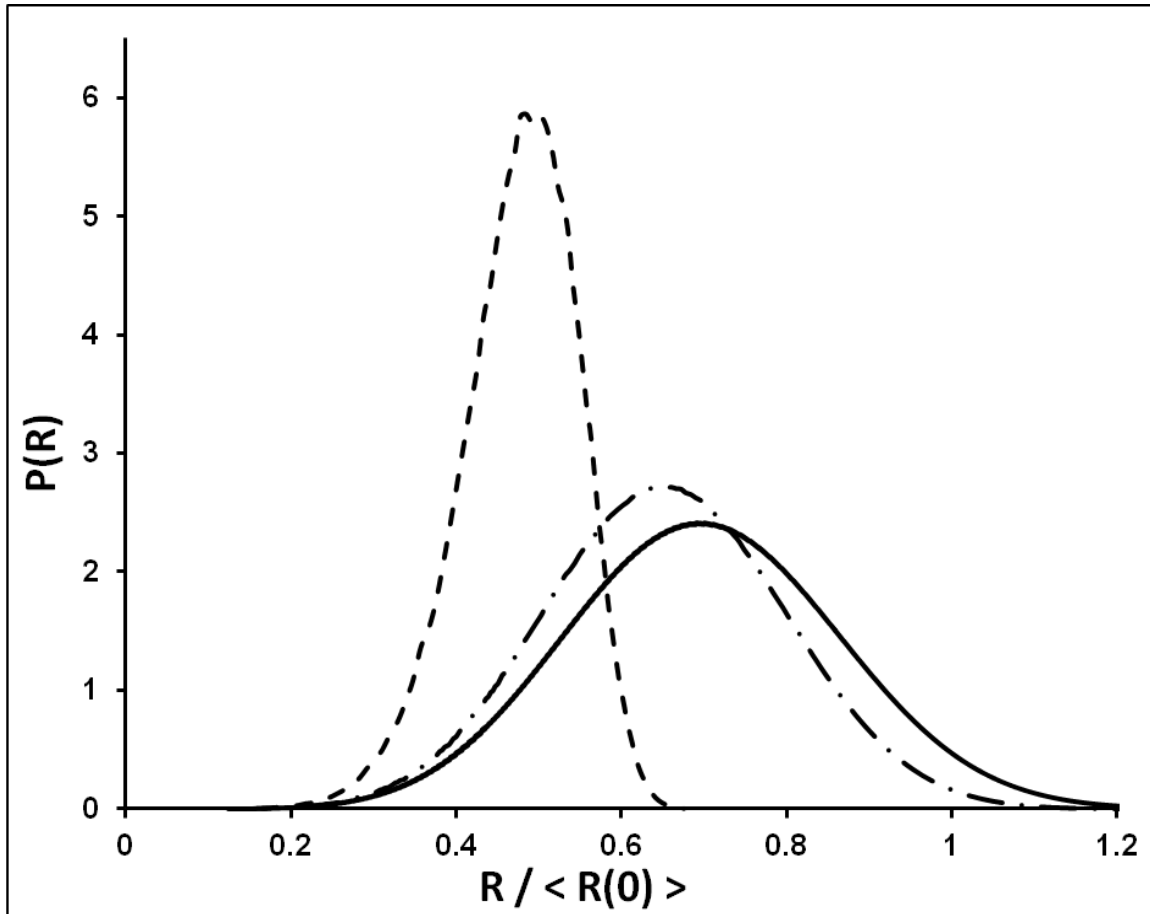


Figure 7

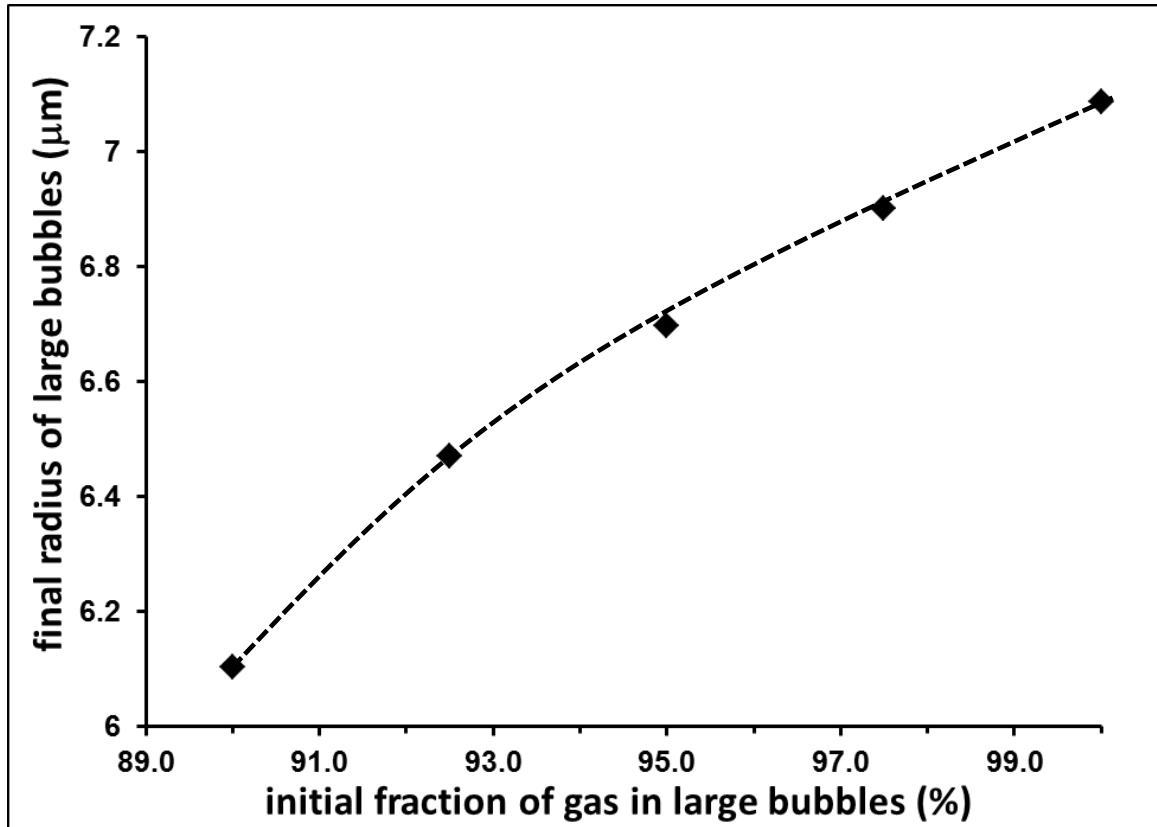


Figure 8

