Marangoni Bursting: A Report

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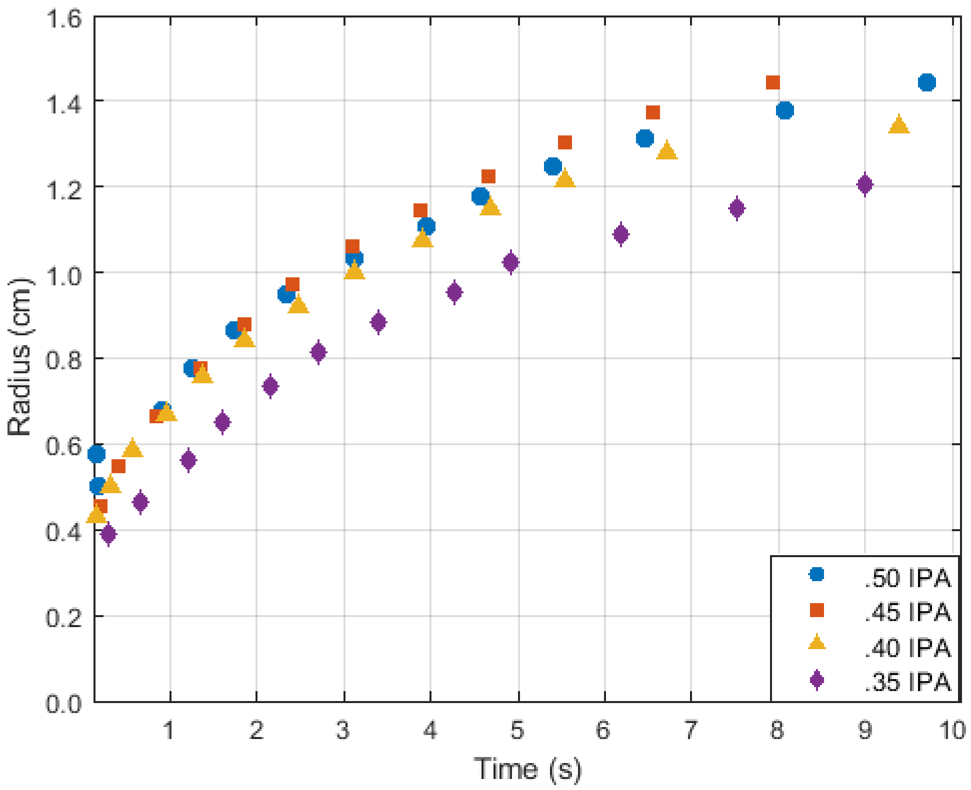

Figure 1: Temporal evolution of daughter droplet radius for different IPA mass fractions (IPA = 0.50, 0.45, 0.40, 0.35)."

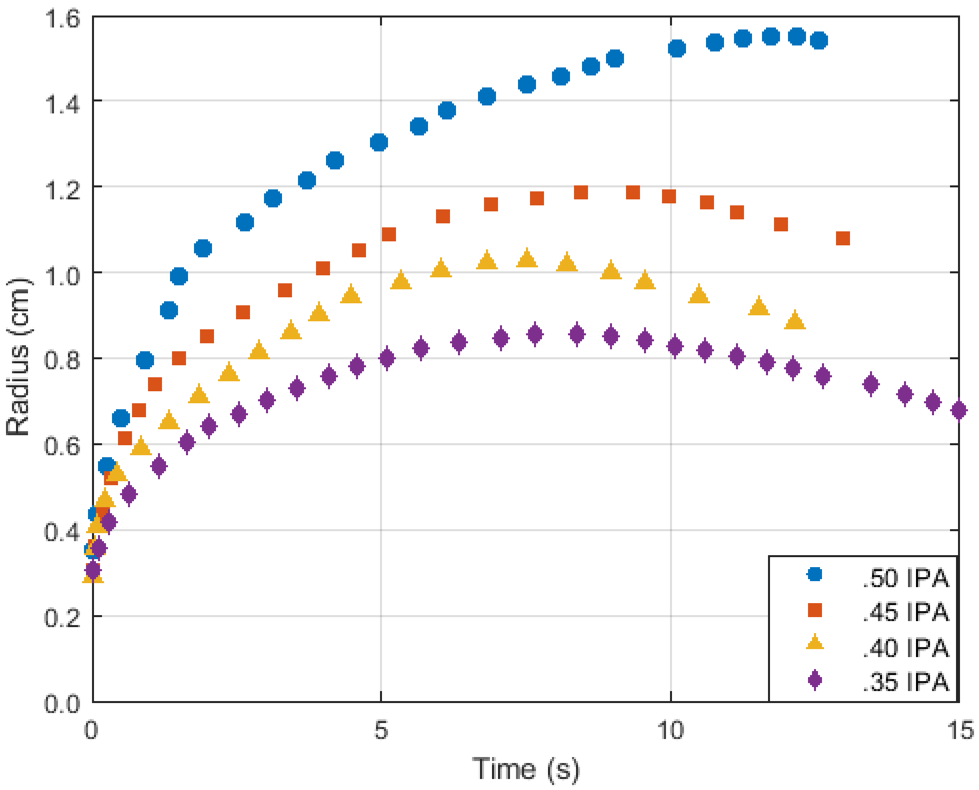

Figure 2: Temporal evolution of mother droplet radius for different IPA mass fractions (IPA = 0.50, 0.45, 0.40, 0.35)."

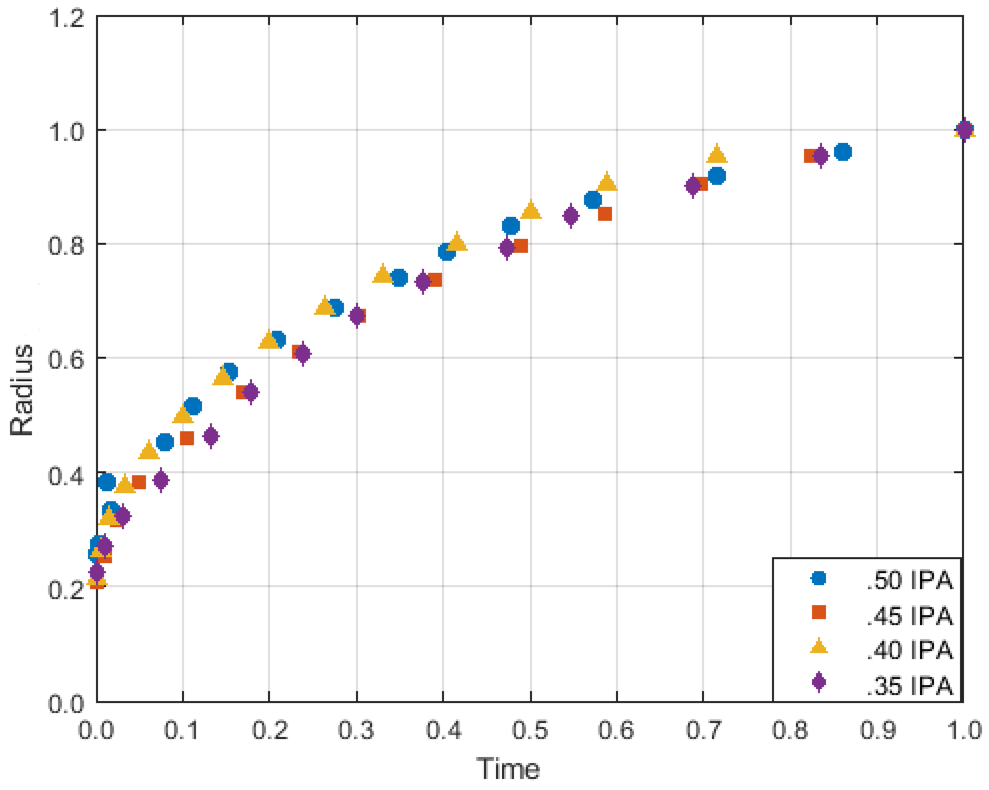

Figure 3: Normalized daughter droplet radius (r/r_0) vs. normalized time (t/t_0) for IPA mass fractions of 0.50, 0.45, 0.40, and 0.35.

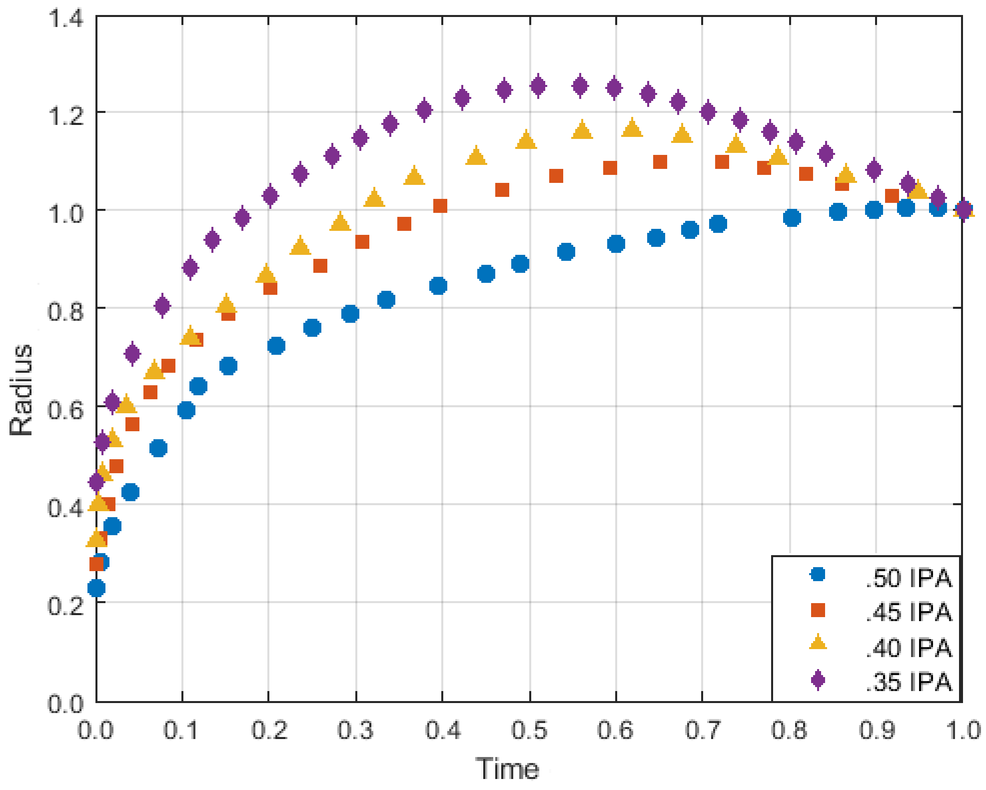

Figure 4: Figure 3: Normalized mother droplet radius (r/r_0) vs. normalized time (t/t_0) for IPA mass fractions of 0.50, 0.45, 0.40, and 0.35.

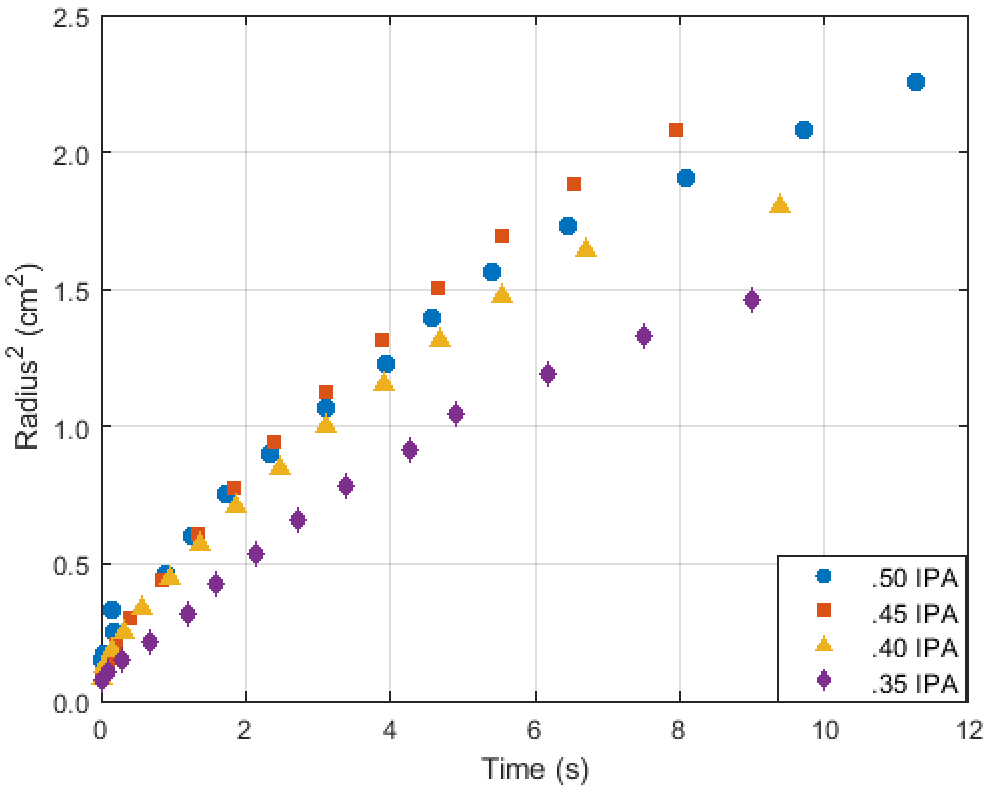

Figure 5: Squared daughter droplet radius as a function of time for isopropyl alcohol (IPA) mass fractions of 0.50, 0.45, 0.40, and 0.35.

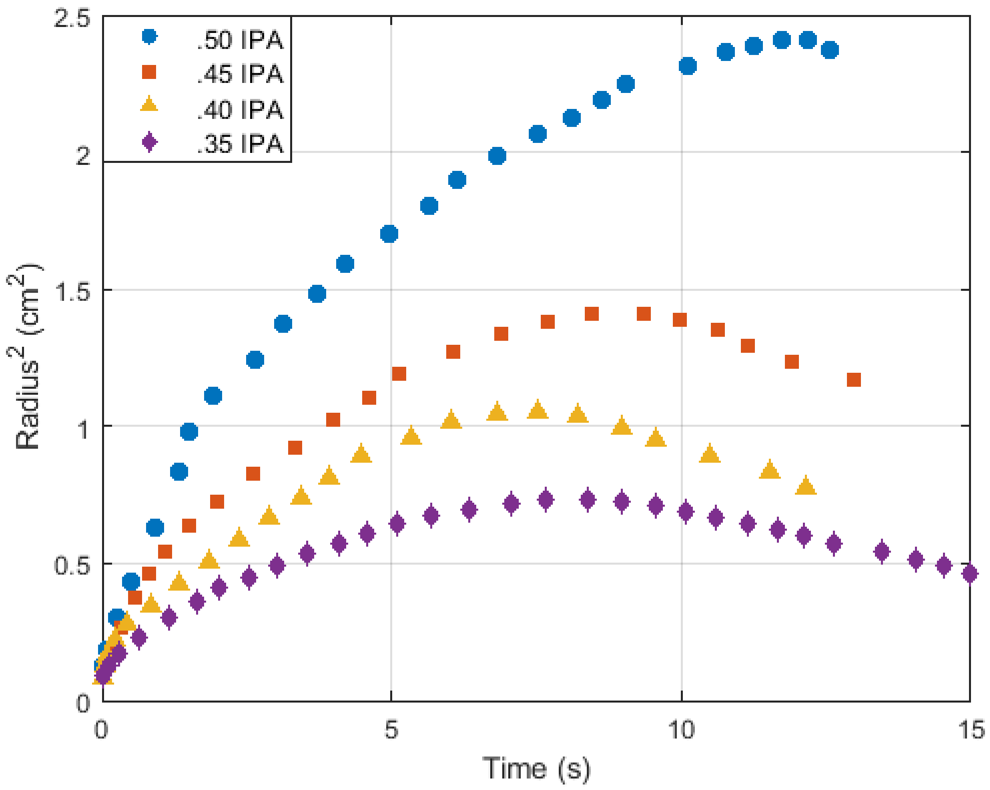

Figure 6: Squared mother droplet radius as a function of time for isopropyl alcohol (IPA) mass fractions of 0.50, 0.45, 0.40, and 0.35.

Solution to differential equation in radial coordinates

$$C(r,t)= \frac{M}{4\pi Dt}\exp(-\frac{r^2(t)}{4Dt}) \longrightarrow r(t) = \frac{2\sqrt{Dt * \ln(4\pi Dt * C(r,t))}}{M}$$

- C(r, t): Concentration at radius r and time t.
- M: Total mass of the substance diffusing.
- D: Diffusion coefficient (m^2/s or cm^2/s).
- t: Time since release.
- r: Distance from the origin (radial coordinate)
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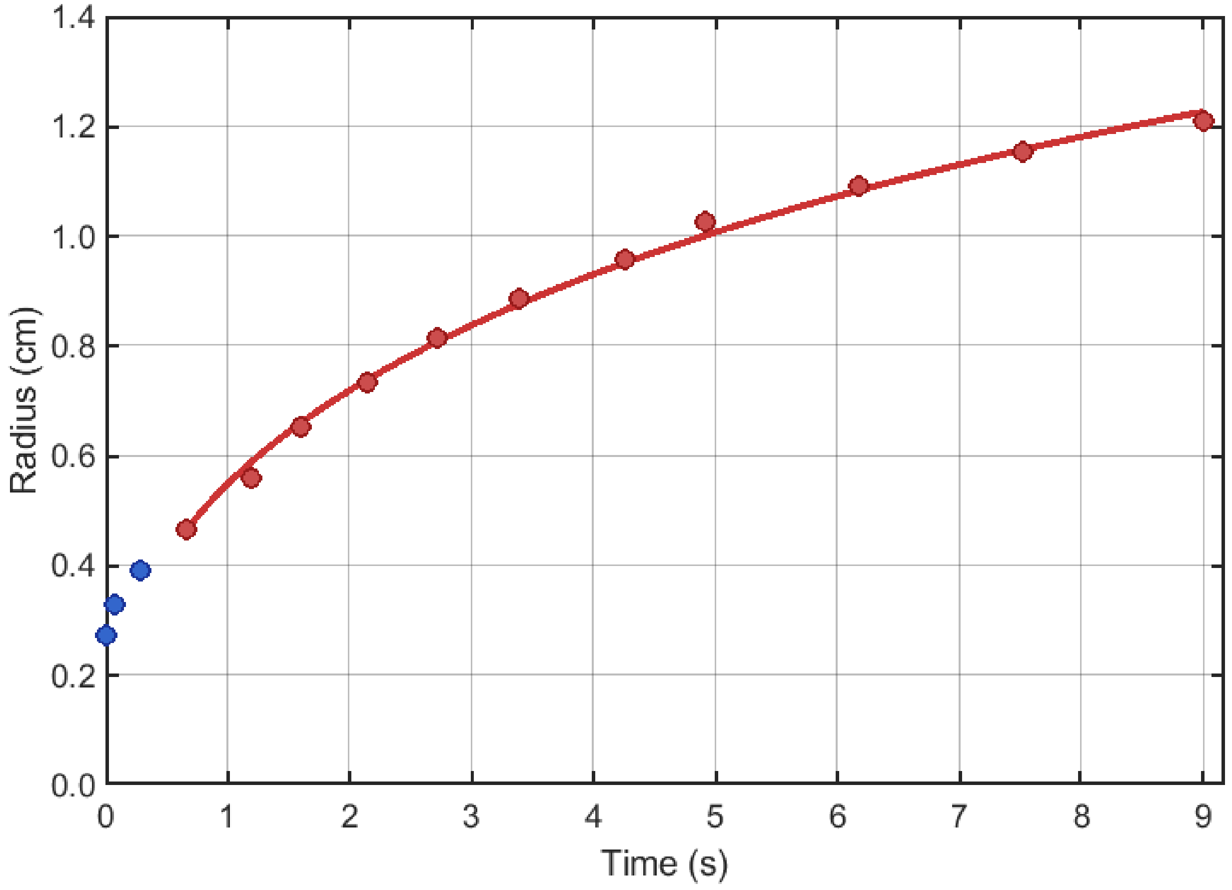

Figure 7: The radius vs. time data (circles) fitted with diffusion model r(t) = 2√(Dt ln(A/t)) (red line). Fitted parameters: D = 1.51×10^{-2} cm^2/s, A = 143, R^2 = 0.9966. The excellent fit confirms diffusion-controlled Marangoni spreading.