Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

On the origin of the driving force in the Marangoni propelled gas bubble trapping mechanism

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Table S1. Parameters and their descriptions used in COMSOL simulations for 1,4-dioxane solvent

Parameter symbol	Description	Experimental conditions and values for 1,4-dioxane
T_a	Reference temperature (room temperature)	293.15 K
ΔT	Excess temperature due to laser heating	20 K
$\sigma(T)$	Surface tension	$33 \cdot 10^{-3}$ N·m^{-1} (at 293K) $28.83 \cdot 10^{-3}$ N·m^{-1} (at 323K)
$\sigma_T = \frac{\partial \sigma}{\partial T}$	Temperature coefficient of surface tension	$-0.1391 \cdot 10^{-3}$ N·m^{-1}·K^{-1}
ρ	Fluid density	1033 kgm^{-3}
μ	Dynamic (shear) viscosity coefficient	$1.1766 \cdot 10^{-3}$ Pa·s (at 298K) $0.787 \cdot 10^{-3}$ Pa·s (at 323K)
$\nu = \frac{\mu}{\rho}$	Kinematic viscosity (momentum diffusivity)	$1.139 \cdot 10^{-6}$ m^2·s^{-1}
k	Thermal conductivity coefficient	0.159 W·m^{-1}·K^{-1} (at 298K) 0.147 W·m^{-1}·K^{-1} (at 323K)
$\alpha_T = \frac{k}{\rho C_p}$	Thermal diffusivity	$8.94 \cdot 10^{-8}$ m^2·s^{-1} (at 298 K)
C_p	Specific heat at constant pressure	1721 J·kg^{-1}· K^{-1}
α	Heat expansion coefficient	$1.03 \cdot 10^{-3}$ K^{-1}
$\vec{u}$	Fluid velocity vector	m·s^{-1}

Descriptions of attached movies with .avi extension:

SIM1. Soot particles movements around the cylindrical bubble showing streams of fluid driven by laser induced Marangoni effect.

SIM2. Slow motion movie of movements of fluid streams due to Marangoni effect visualized by soot particles. The liquid/gas interface is deformed toward laser position due to Marangoni flows.

SIM3. Slow motion movie of movements of fluid streams due to Marangoni effect visualized by soot particles at the liquid/gas interface.

SIM4. Phenomenon of long distance gas bubble trapping by laser light absorbed in the pNA-1,4-dioxane solution as viewed in a real time movie.