Supporting Information: Non-photochemical laser-induced nucleation of supercooled glacial acetic acid

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1. Near-infrared absorbance of acetic acid

The near-infrared absorption of glacial acetic acid (GAA) was measured using a spectrometer (Perkin–Elmer, Lambda 900). The heat capacity \( (C_p = 1.930 \text{ J g}^{-1} \text{ K}^{-1}) \) and density \( (\rho_L = 1.080 \text{ g cm}^{-3}) \) of GAA at –9 °C were estimated by fitting and extrapolation of data from the literature.\(^1\), \(^2\)

For a single pulse at a peak power of 40 MW cm\(^{-2}\), the energy absorbed by acetic acid in the illuminated volume \((0.046 \text{ cm}^3)\) corresponds to a temperature rise of 6 mK; at 900 MW cm\(^{-2}\), the rise is 0.14 K. We assume that convection and conduction are sufficiently fast to allow redistribution of heat throughout the entire volume of the sample \((2 \text{ cm}^3)\). At a peak power of 40 MW cm\(^{-2}\), the energy absorbed by acetic acid would be 0.6 mJ pulse\(^{-1}\), corresponding to a temperature rise of 14 mK for 100 pulses.

![Figure S1](image)

**Figure S1.** Plot of the near-infrared absorption coefficient of water and acetic acid. The absorption coefficients at 1064 nm, marked by the arrow, are 0.144 cm\(^{-1}\) (water, Kou et al.\(^3\)) and 0.0370 cm\(^{-1}\) (acetic acid, present work).
2. Refractive indices of acetic acid

The refractive indices of GAA at 1064 nm and –9 °C are not readily available, therefore we estimated them by extrapolation from available data in the literature. For the liquid, we extrapolate measurements of El-Kashef to find $n_L = 1.3614$ (at 1064 nm, –9 °C). For the solid, we use the Lorenz–Lorentz relation to estimate $n_S$ from $n_L$ at a specific frequency and temperature, using the densities of the solid ($\rho_S = 1.274$ g cm$^{-3}$ by interpolation from literature data$^1$) and the liquid ($\rho_L = 1.080$ g cm$^{-3}$). We calculate $n_S = 1.4357$ at 1064 nm, which is in very good agreement with our calculations for a crystalline cluster consisting of 27 unit cells using the semi-empirical PM6–DH+ method ($n = 1.4385$).$^6-8$