SUPPLEMENTARY MATERIALS

Derivation of Eqs. (17-18) and (19-20).

Models 2 and 3 differ from Model 1 mainly by the assumed source of air, needed to replace the evaporating water from the porous material.

Model 2 is based on the assumptions that the bubble volume remains constant during drying, $V_{B0} = V_{BD} = \Phi_0 V_{F0} = \Phi_0 \beta(\varphi_{P0}) m_p / (1-\Phi_0)$. This assumption implies that the foam wall shrinkage is exactly equal to the amount of evaporated water during the initial shrinkage stage (ideal shrinkage), while the subsequent water evaporation (at closely-packed particles in the walls) is compensated by air taken from the atmosphere to fill the nano- and micro-pores between the particles. After substituting the above expression for V_{BD} into eqs. (11) and (12), one obtains eqs. (17)-(18). According to Model 2, the shrinkage during drying should depend both on the initial particle concentration, φ_{P0}, and on the initial air volume fraction, Φ_0. The shrinkage should disappear completely if the initial foam is prepared from suspension with initial particle concentration of $\varphi_{P0} = 0.332$ when $\rho_{wall} = 460$ kg/m^3.

In Model 3 we assume that the evaporating water in the foam wall is replaced by air taken from the bubbles. If there is no enough air in the bubbles to replace the evaporating water, the additional air is taken from the atmosphere until the density of the wall reaches the particle close packing, ρ_{wall}. Therefore, the requirement to have enough air in the bubble to replace the evaporating water is:

$$V_{B0} = V_{S0} - V_{SD} = m_p \left(1/\varphi_{P0} - 1/\varphi_{PD}\right)/\rho_W = \Phi_0 \beta(\varphi_{P0}) m_p / (1-\Phi_0) \qquad \text{(S.1)}$$

which predicts that the initial bubble volume fraction for having sufficient air in the bubbles should be above:

$$\Phi_{CR} = \frac{\left(\frac{1}{\varphi_{P0}} - \frac{1}{\varphi_{PD}}\right)\frac{1}{\rho_w}}{\beta(\varphi_{P0}) + \left(\frac{1}{\varphi_{P0}} - \frac{1}{\varphi_{PD}}\right)\frac{1}{\rho_w}} \qquad \text{(S.2)}$$

For $\varphi_{P0} = 0.15$ and $\varphi_{PD} = 0.875$ the required initial air volume fraction of the bubbles is $\Phi_{CR} = 0.47$, whereas the required volume fraction is $\Phi_{CR} = 0.223$ for $\varphi_{P0} = 0.332$. In most of our experiments the initial bubble volume fraction is above 0.5 and $\varphi_{P0} > 0.15$, which means that there is enough air in the bubbles to fill in the space after water evaporation. Under these assumptions we can write:

$$V_{BD} = V_{B0} - \left(V_{S0} - V_{SD}\right) = \Phi_0 \beta\left(\varphi_{P0}\right) m_p \big/ \left(1 - \Phi_0\right) - \left(\frac{1}{\varphi_{P0}} - \frac{1}{\varphi_{PD}}\right) m_p \Big/ \rho_w \qquad \text{(S.3)}$$

Substituting Eq. (S.3) into Eqs. (11)-(12) one obtains Eq. (20) for K and the following expression for the mass density of the samples:

$$\begin{aligned} \rho_{PM} &= \frac{1}{\Phi_0 \beta\left(\varphi_{P0}\right) \varphi_{PD} \big/ \left(1 - \Phi_0\right) - \left(\varphi_{PD} / \varphi_{P0} - 1\right) \big/ \rho_w + 1 / \rho_{wall}} && \text{at } \Phi_0 > \Phi_{CR} \\ \rho_{PM} &= \rho_{wall} && \Phi_0 < \Phi_{CR} \end{aligned} \qquad \text{(S.4)}$$

As explained above, $\Phi_0 > \Phi_{CR}$ in our experiments and Eq. (S.4) can be simplified into Eq. 19.