

In this supplementary material, we give a few details on the experimental setup in Fig. 1, we illustrate the main steps of the image processing in Fig. 2, we provide the distributions of local mean curvatures in Fig. 3, and finally we give a short description of the sampling bias calculation for the domain volume distribution.

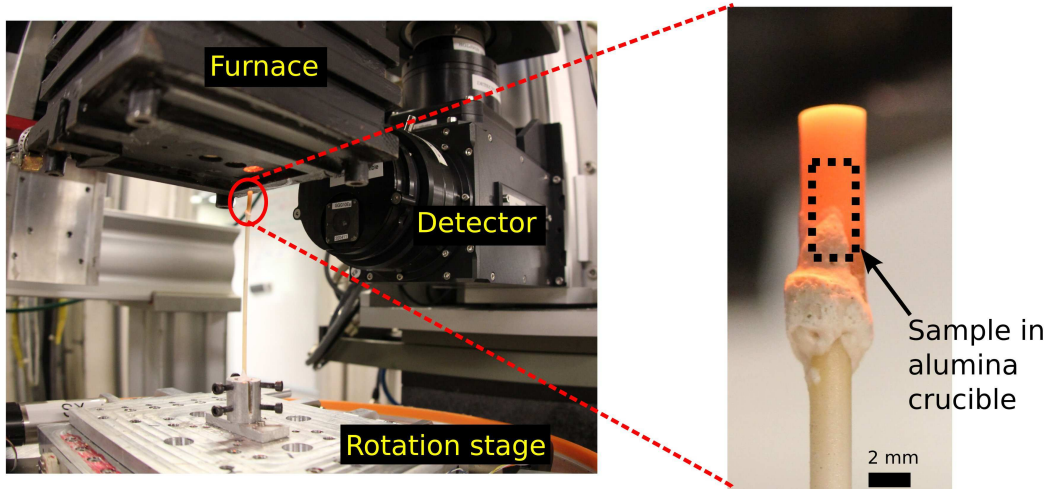


FIG. 1. Experimental setup: 2-mm samples are machined from the barium borosilicate glass, placed into fused silica tubes held by alumina crucible. The crucible is at the top of an alumina rod, on a rotating stage. A dedicated furnace (“Ecole des Mines” furnace) is mounted on a translation stage above the rod and can move down for the heat treatments. By moving back the furnace to its original position, the sample is quenched in air to room temperature. The typical time scale to move the furnace and to switch from room temperature to (or back from) 1200 °C is approximately 30 s. Radiographs are recorded at different angles, using the Leuven rotation stage; a LuAG scintillator converts the X-Ray light to visible light, finally a Frelon CCD camera records the images. On this image, the X-Rays are coming from the left side.

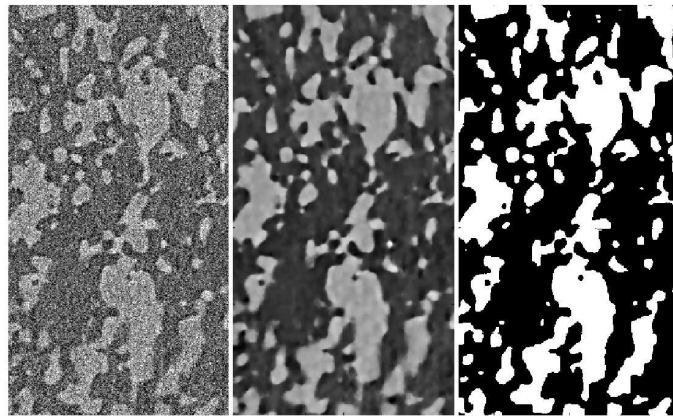


FIG. 2. Portion of slices of reconstructed data, the barium-rich phase appears as white (or light grey), the silica-rich appears as black (or dark gray). First a raw image (left) after reconstruction with a standard filtered back-projection (FBP) algorithm. This image is then filtered with a Total Variation filter (middle) [1] to reduce the noise; this filter is particularly relevant as it converges towards an image with volumes of piecewise constant gray levels limited by sharp interfaces, which is the kind of features expected in the late stage of phase separation. A fraction of the pixels can then be attributed unambiguously to one of the phases from the histogram of gray levels. Then, the remaining pixels are labelled using an anisotropic diffusion from the markers realized by the Random Walker algorithm [2] (right). The denoising step, as well as the segmentation, are performed on 3D images.

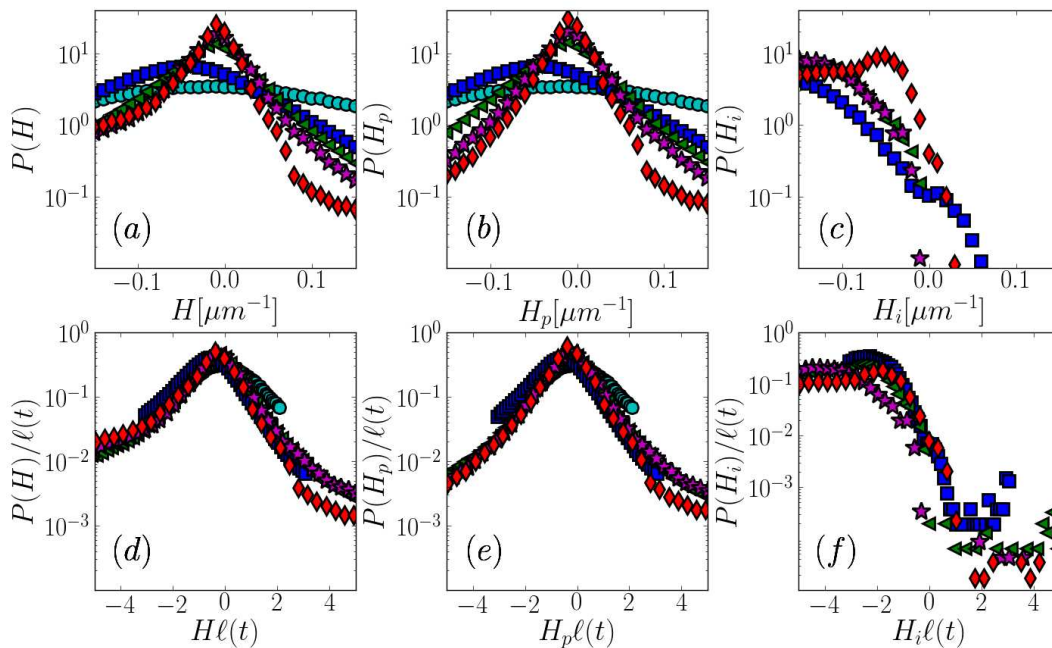


FIG. 3. Mean curvature distributions ; before (top), and after rescaling by the characteristic length ℓ (down); for all domains: H (a, d), only percolating: H_p (b, e) and only isolated domains: H_i (c, f). After 8 (●), 16 (■), 32 (▲), 45 (★) and 64 min (◆) at 1130 °C. In these graphes, the mean curvature is negative for spheres.

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Sampling bias evaluation

As we have a limited field of view, we expect large domains to be sampled less frequently than small ones. Indeed, a large domain is more likely to touch an edge of the image and not being taken into account. In order to correct this effect, we compute the probability for each domain to touch an edge of the image when thrown randomly in it. As the shapes of the domains are intricate, and the shape of the image is not trivial (cylindrical shape, due to the reconstruction procedure), an analytical solution is not easily accessible. To evaluate the probability, we decided to perform a Monte Carlo integration of it: simply throwing randomly each domain in the field of view, and counting how many times it touches an edge, and how many times not.

Assuming that domains of similar volumes have a similar shape, we can estimate for each class of volume the sampling bias. Note that this bias will diverge when the domain size is of the order of the image size.

[1] A. Chambolle, Journal of Mathematical Imaging and Vision **20**, 89 (2004).

[2] L. Grady, IEEE transactions on pattern analysis and machine intelligence **28**, 1768 (2006).