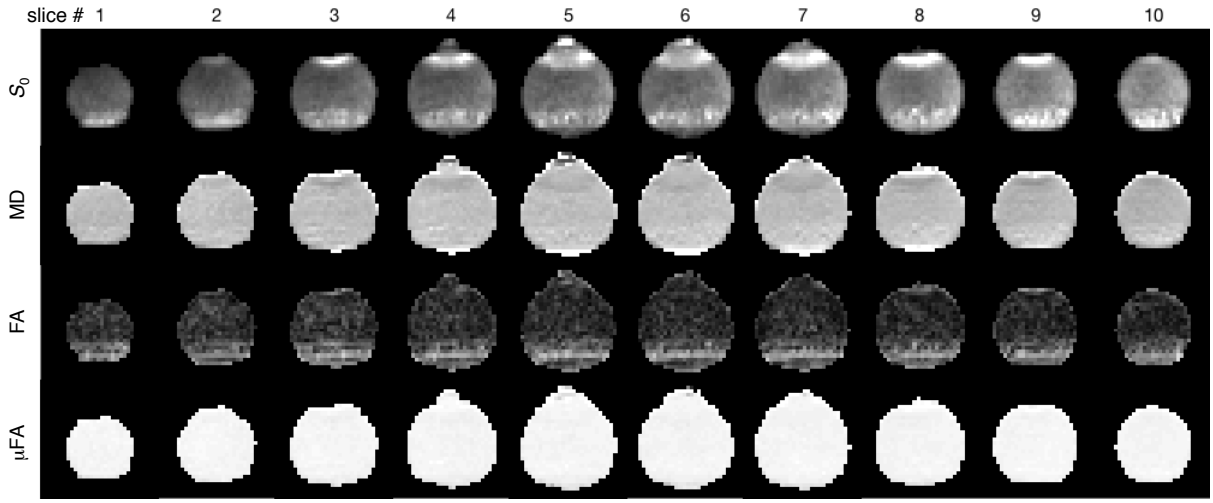
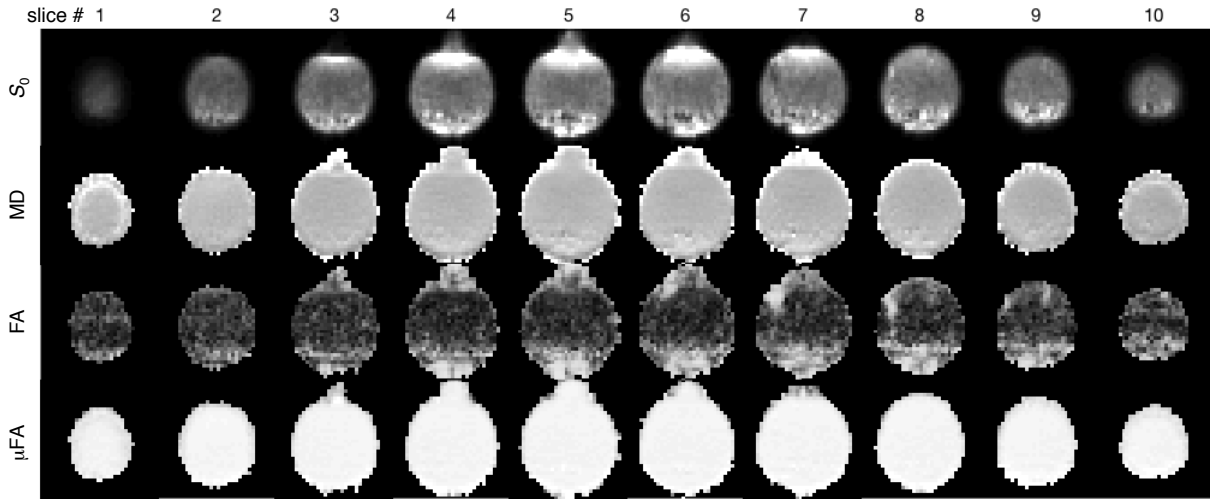
Supporting Table S1. Temperature stability range of the reverse hexagonal phase for samples with chemical compositions at and around the value chosen for the phantom.

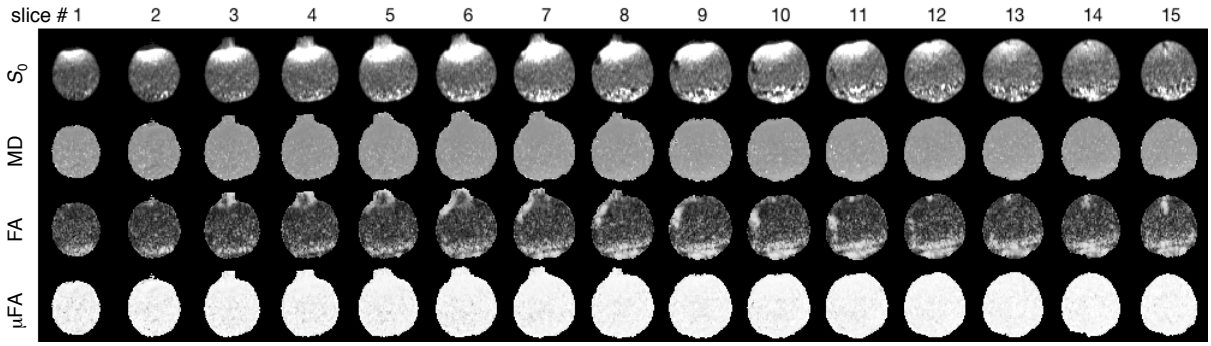
Chemical composition (wt%)			**Temperature range (°C)**	
AOT	isooctane	water	Lower limit	Upper limit
47.91	15.12	36.97	<5	29.0
46.00	14.52	39.47	<5	30.0
44.70	14.11	41.19	<5	30.0
44.12	13.94	41.94	<5	31.0
43.43	13.71	42.86	<5	31.5
41.79	13.19	45.02	<5	32.0



Supporting FIG. S1. Parameter maps for all slices of the experimental data in FIG. 4. The S_0, MD, and μFA maps were obtained with the *gamma* model, while the FA map is from standard *DTI* analysis. The gray scales have the same meanings as in FIG. 4.



Supporting FIG. S2. Demonstration of the long-time stability of the phantom. The data was acquired one year after the original measurements reported in FIG. 4 and Supporting FIG. S1 using the same scanner, experimental settings, and data processing pipeline. The gray scales have the same meanings as in FIG. 4. Note that the μFA maps remain uniform with values near unity.



Supporting FIG. S3. Application of the phantom on a conventional MR scanner. The data was acquired with the same phantom in Supporting FIG. S2 using a conventional Siemens Magnetom Prisma 3T scanner with 0.080 Tm^{-1} maximum gradient strength and 200 $Tm^{-1}s^{-1}$ slew rate at a spatial resolution of 2.0 × 2.0 × 4.0 mm^3 using an optimized acquisition protocol as described in Ref. (98). The data processing pipeline and visualization was the same as in Supporting FIG. S1. Note the uniformity of the μFA maps with values near unity.