**Reversible writing/deleting of magnetic skyrmions through hydrogen adsorption/desorption**

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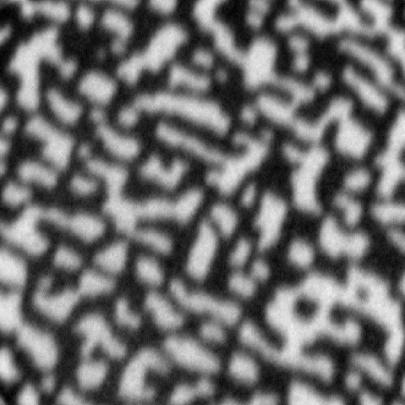
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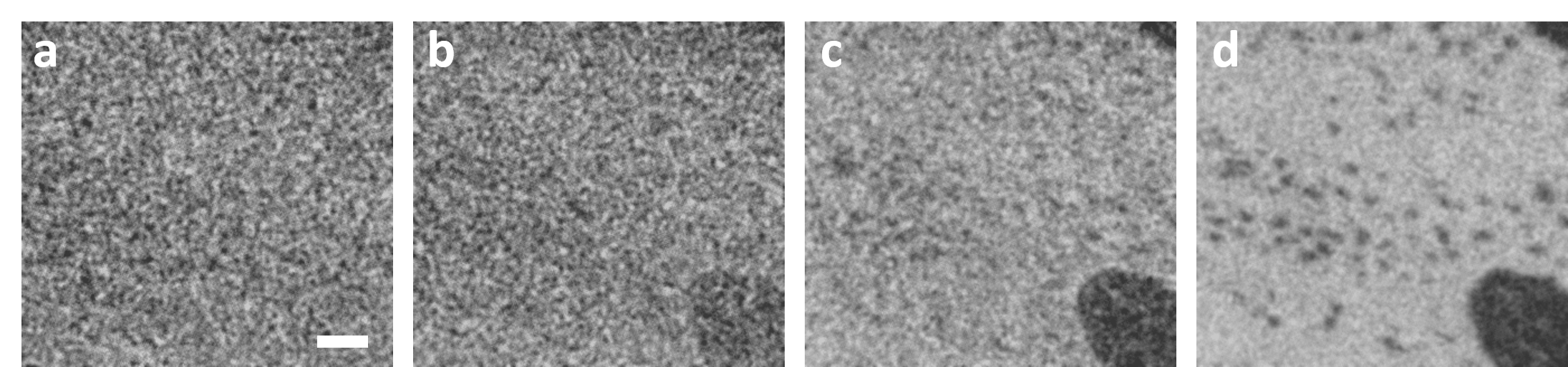
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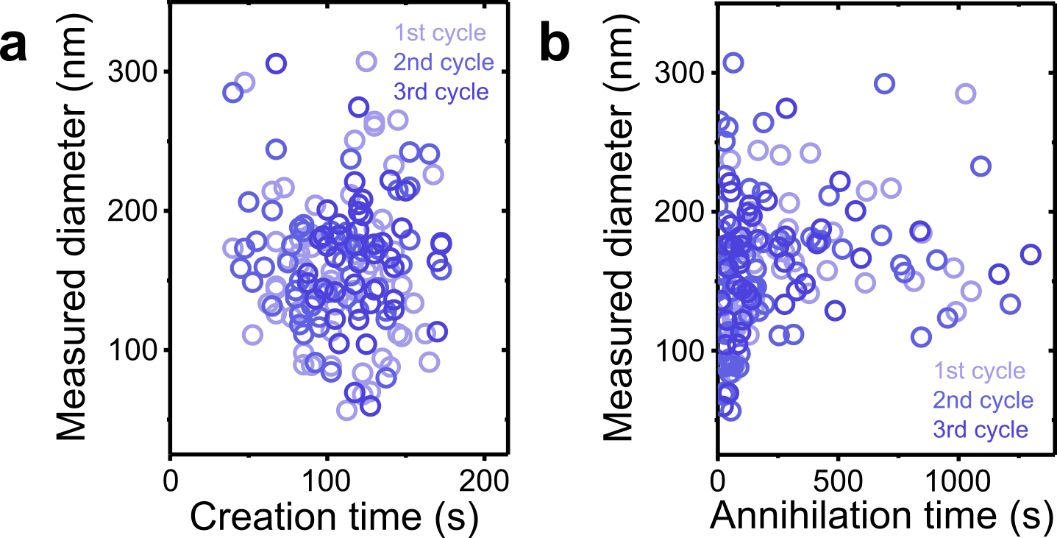
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**Figure S1**. SPLEEM image with out-of-plane sensitivity of 24ML Ni/2ML Fe/1ML Ni/Cu(001), showing bubble-like domain pattern in the absence of magnetic field. The field of view is 7 μm.



**Figure S2**. SPLEEM images with out-of-plane sensitivity as a function of Ni thickness *d*Ni in Ni/3ML Co/5ML Pd/W(110), showing the evolution of out-of-plane magnetized domains during the SRT. (a) *d*Ni = 0 ML, (b) *d*Ni = 0.20 ML, (c) *d*Ni = 0.27 ML, (d) *d*Ni = 0.31 ML. Scale bar 1μm.



**Figure S3**. Relations between skyrmion diameter and the time required for skyrmion creation (panel a) and annihilation (panel b) over three cycles. The creation/annihilation time is counted from the instant when the hydrogen valve is turned ON/OFF until the moment each skyrmion appears/disappears.