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**Formation and visualization of individual skyrmions in confined geometries** HAIFENG DU, High Magnetic Field Laboratory, CAS, Hefei 230031, China, XUEBING ZHAO, RENCHAO CHE, Department of Materials Science,Fudan University, Shanghai 200438, China, MINGLIANG TIAN, High Magnetic Field Laboratory, CAS, Hefei 230031, China, RENCHAO CHE COLLABORATION, MINGLIANG TIAN TEAM — Magnetic skyrmions are topologically stable whirlpool-like spin textures that offer great promise as information carriers for future ultra-dense memory and logic devices. Here, we report the visualization of the skyrmion chains in FeGe nanostripes and skyrmion clusters in nanodisks by high resolution Lorentz TEM, and the electrical probing of individual skyrmions in MnSi nanowires when the wire diameter is comparable to that of a skyrmion. Specifically, we found that the highly stable skyrmion chain originated from the termination of the spin helix at the edges of the nanostripes under the action of applied field, and the field-driven transition of skyrmion cluster states in nanodisks. These findings demonstrate that the geometry defects can be used to control the formation of topologically nontrivial magnetic objects. Finally, we present the electrical probing of such magnetic field-driven skyrmion cluster (SC) states in ultra-narrow single-crystal MnSi nanowires (NWs) with diameters (40 – 60 nm), where the creation or deletion of an individual skyrmion in the cluster states leads to quantized jumps in magnetoresistance (MR), which is supported by the Monte Carlo simulations.

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