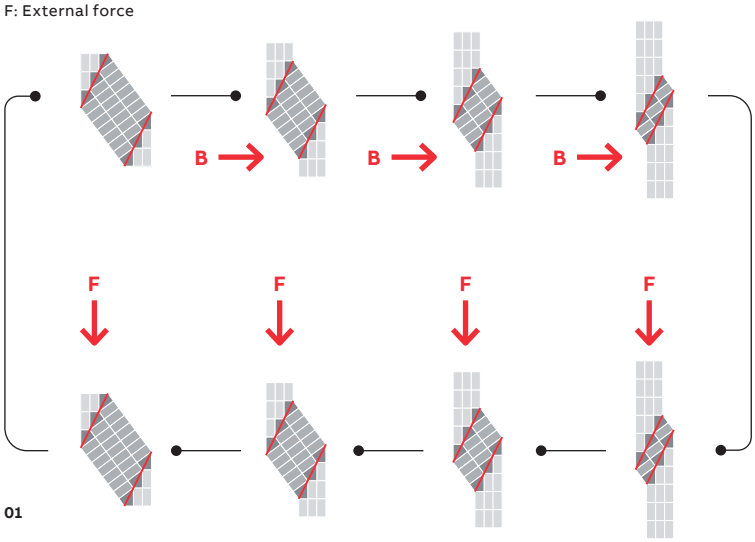
B: External magnetic field
F: External force



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01 Applying an external magnetic field (B) leads to a proportional deflection of the folded crystal structure. In standard applications, resetting to the original shape is done via an external force (F).

polarized crystal structure within these sticks allows them to deform when an external magnetic field is applied →01.

The combination of thermal and magnetic effects makes MSMAs ideal for applications where both a thermal and a magnetic response is required – eg, in a domestic miniature circuit breaker (MCB).

DEs form the last class of smart materials listed above. The rubbery DE material is typically sandwiched between two electrode plates of opposite polarity, as in a standard capacitor. An applied voltage causes the plates to mutually attract, squeezing the elastomer. This basic deformation allows a wide versatility of actuator designs. In sensing mode, any displacement of the DE (configured as a membrane, for example) changes the capacitance, allowing precise deformation measurement. The first industrial products employing this principle will be launched soon.

Smart materials offer a wide range of functionality for many actuation and sensing applications – and all with a very simple design with a low part count compared to alternative solutions. Smart, indeed. •

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andreas.moglestue@ch.abb.com

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abb.review@ch.abb.com

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