From Stimuli Responsive and Shape Memory Materials to Algorithmic Materials that Mimic Behaviorists´ Classical Conditioning

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In bioinspired materials there is a search for ever more complex functionalities and responses. Classic functionalities in materials science are stimuli-responses and shape-memory effects, relevant for numerous applications. Beyond those, could materials showing a response to a particular stimulus become responsive to another stimulus to which they are originally indifferent? Such a behavior would mimic the classical conditioning in behavioral psychology, one of the elementary forms of associative learning, originally shown by Pavlov in his experiments with dogs (1,2). Here we demonstrate two soft matter systems (a hydrogel and a liquid crystalline network) programmed to mimic classical conditioning (3-5). We foresee a wealth of possibilities for different materials systems, combinations of stimuli and different "memory" concepts for classically conditioned functional materials.

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