**Extent and Persistence of Magnetic Interactions in Ultra-short 1D Fe Chains**

**with Controlled Boundary Conditions**

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Abstract:

A method for the fabrication of large arrays of ultra-short (7 to 200  atoms long) Fe chains that allow precise control of length and boundary conditions is presented. A comparative study reveals that electronic hybridization of the Fe atoms at the ends of the chain results in significant changes in the magnetic response as compared to unmodified chains. In chains subject to hybridization, the coercive field increases with length whereas in chains not subject to hybridization the coercive field remains almost constant. This experimental result indicates that the entire magnetic response of 1D chains can be controlled by inducing changes in the electronic environment of the end atoms. A semiclassical model that includes short-range exchange and Dzyaloshinskii-Moriya interactions explains quantitative this behavior.