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Ferromagnetic Nanocrystals of Antiferromagnetic FeGe C.G. ZENG, MARIA VARELA, PAUL KENT, MARKUS EISENBACH, GEORGE MALCOLM STOCKS, MARIA TORIJA, JIAN SHEN, HANNO WEITERING — Epitaxial nanocrystals of FeGe have been stabilized on Ge(111). The nanocrystals assume a quasi one-dimensional shape as they grow exclusively along the $<1\bar{1}0>$ direction of the Ge(111) substrate, culminating in the monoclinic modification of FeGe. The uni-directional growth results from a close match between the Ge-atom spacing along $<1^{-}10>$Ge and monoclinic b-axis of FeGe. Whereas monoclinic FeGe is antiferromagnetic in the bulk, the nanocrystals are surpisingly strong ferromagnets below $\sim$200 K with an average magnetic moment of 0.8 μ_B per Fe atom. Density functional calculations demonstrate that volume ferromagnetism is stabilized predominantly by compressive strain normal to the growth direction of the nanocrystals.

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