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## Magnetic properties of a single iron atomic chain encapsulated in armchair carbon nanotubes: A Monte Carlo study

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### Abstract

The magnetic properties have been investigated of  $\text{FeCu}_x\text{C}_{1-x}$  for a Fe atom chain wrapped in armchair (N,N) carbon nanotubes (N=4,6,8,10,12) diluted by  $\text{Cu}^{2+}$  ions using Monte Carlo simulations. The thermal total magnetization and magnetic susceptibility are found. The reduced transition temperatures of iron and carbon have been calculated for different N and the exchange interactions. The total magnetization is obtained for different exchange interactions and crystal field. The Magnetic hysteresis cycles are obtained for different N, the reduced temperatures and exchange interactions. The multiple magnetic hysteresis is found. This system shows it can be used as magnetic nanostructure possessing potential current and future applications in permanent magnetism, magnetic recording and spintronics.

**Keywords:** Carbon nanotubes; Monte Carlo simulations; Reduced transition temperature; Magnetic coercive field.

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