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Nonlinear behavior of the impedance spectrum of a kerosene based ferrofluid



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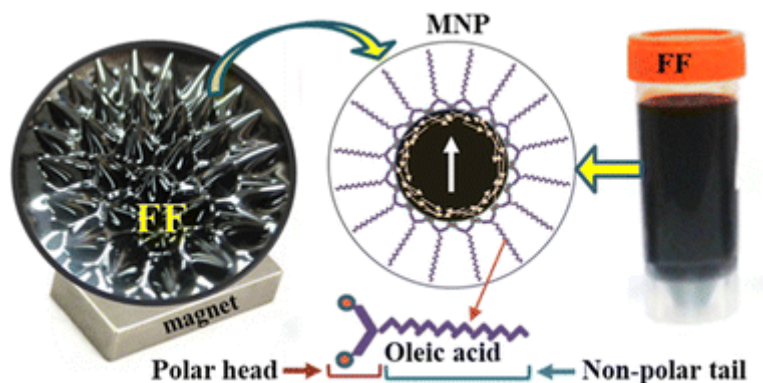
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Abstract

We investigate the nonlinear behavior of the electric impedance of a kerosene-based ferrofluid (FF) sample subjected to an ac electric voltage of amplitude ranging from 10 mV to 3 V in the frequency range 6.3 mHz, 100 kHz. The FF sample was inserted between two parallel gold electrodes separated by 127 μm distance. The results show that even a sinusoidal voltage of amplitude low as 80 mV can give

origin to nonlinear effects for frequency of the applied voltage smaller than 100 mHz. Our experimental data confirm the results obtained by solving numerically the equations of the Poisson–Nernst–Planck model. From this agreement it follows that the model based on the equation of continuity for the mobile ions, and the equation of Poisson for the actual potential across the sample, works well also in its non-linear version.

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