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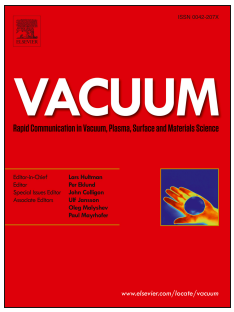

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Ozone assisted thermal oxidation for fabrication of iron oxide nano-wall arrays with high magnetoresistance

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Abstract

Two dimensional (2D) vertically-aligned crystalline α-Fe_2O_3 nano-wall arrays were prepared by thermal oxidation of iron substrates under the O_3 ambient. It is found that α-Fe_2O_3 nano-partitions can be produced in a process temperature region of 450-500^{o}C. Higher growth temperatures (650-700^{o}C) produced wholly nanowires. The transition from 2D sheet-like nanostructures to 1D nanowires can be described by surface diffusion growth mechanism. The iron oxide nanowires present very weak magnetoresistance at different magnetic fields. However, the α-Fe_2O_3 nano-partitions have very strong magnetoresistive properties which a high of 45% resistance variation obtained at low magnetic field of 300 Gauss. This unique property shows the potential of iron oxide nano-partition arrays in detection magnetic field and solid state memory applications.

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