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Surface Hardness Change of HDI-PR Used by PLVA Method for Next Generation Devices

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Recently, many researchers study the next generation semiconductor device for various possibilities. Specially, spin oriented magnetic field effect device have been studied by so many groups but this device is also used photoresist etching process. During the removing of HDI-PR (high dose implanted photoresist) for semiconductor etching process, HDI-PR (for KrF photoresist) remained on semiconductor surface have been so many problems. Recently we study the physical properties of HDI-PR that it can be changed easily during the dipping of PR stripper treated by plasma induced Liquid-Vapor Activation (PLVA) method. Nano-mechanical test instrument performs nano-scale indents through indentation probe during the measurement of the applied force (denoted as P) and the probe displacement (denoted as h) into the sample simultaneously. From nano-indenter system we get the hardness (denoted as H) and the reduced elastic modulus (denoted as Er) from the HDI-PR sample. From these indenter tests, we can calculate the physical properties of HDI-PR after dipping the PLVA PR stripper.

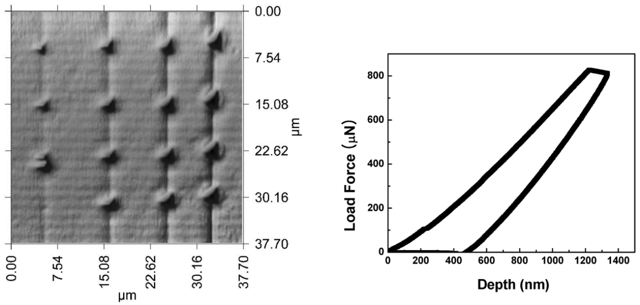

Fig. 1. Hardness and surface image after dipping the PLVA PR striper measured by nano-indentor system.

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Magnetic and Magneto-resistive Properties of Highly Ordered Iron Nanowire Arrays

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The disordered condition in ferromagnetic nanowires can lead to new effects and modification of known one related to spin-depending scatterings such as; giant-magnetoresistance (GMR), tunneling magnetoresistanse (TMR), domain wall magnetoresistance (DWMR) [1]. Particularly, it is shown that the wall contributes to the decoherence of electrons and that this correction can dominate over the Boltzmann resisitivity, leading to a decrease of resisitivity by nucleation of a wall. The magnetoresistanse fluctuation due to the motion of the wall also can takes place [2-4].

The highly ordered ferromagnetic iron nanowire arrays with diameters about 60 nm and 200 nm have been fabricated by electro-chemical deposition into AAO template. X-ray diffraction (XRD) patterns indicate that the [110] direction was oriented along the axis of nanowires. Temperature dependent resistances $R(T)$ show large residual resistance and weak disorder behavior for both nanowire arrays, but relatively abrupt decrease in $R(T)$ of 60 nm nanowire arrays indicates the difference from the existing scattering conditions.

The stronger anisotropic behavior of the 60 nm specimen, revealed from the magnetization curves $M(H)$, is attributed to its higher aspect ratio. The anisotropic magnetoresistance (*AMR*) behavior of $MR(\Delta R/R(R(0))$ of the nanowire arrays has been investigated in full range of angles between nanowires and the applied magnetic field. The obtained difference between the two specimens in *AMR* behavior is atributed to the the effects of various spin diffusion mechanisms on magnetoresistance in iron nanowire arrays, the details will be discussed.

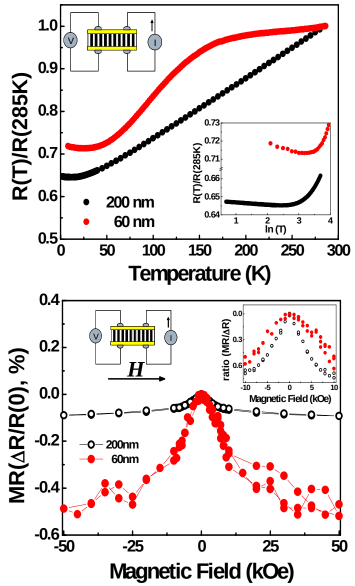

Fig. 1.

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