Deposition and Characterization of Platinum Wires Deposited by a Neon Gas Field Ion Source

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Today's technology for depositing nano scale interconnects is accomplished using Gallium ion beams or electron beams. The requirements for nanoscale interconnections needed for circuit edit or similar applications are exceeding the feature size that Gallium ion beams can provide and material quality that electron beam cans produce. It is difficult to produce feature sizes smaller than 100 nm with Gallium deposited materials under typical conditions and electron beam deposited materials frequently need post processing to obtain useable resistivity. Interconnects deposited by Neon beams should be more suitable for many interconnect applications since the beam will be less damaging to materials than Gallium and the deposited materials will have better intrinsic material properties than interconnects deposited by electron beam. Using Neon as an ion source and Platinum ($C_9H_{16}Pt$) as a precursor we are able to deposit 125nm nano wires (Figure 1) with a bulk resistivity of less than 900 μΩ-cm before optimization. We will discuss the method and process for obtaining these results. We will compare Neon deposited results to Gallium deposited materials (optimized for circuit edit) and compare to results using a He gas field ion source. We will discuss some of the challenges of determining the material resistivity for such small structures as well as present characterization data that shows similar electrical behaviors for Tungsten wires deposited by Gallium and Platinum wires deposited by Neon.

Figure 1:

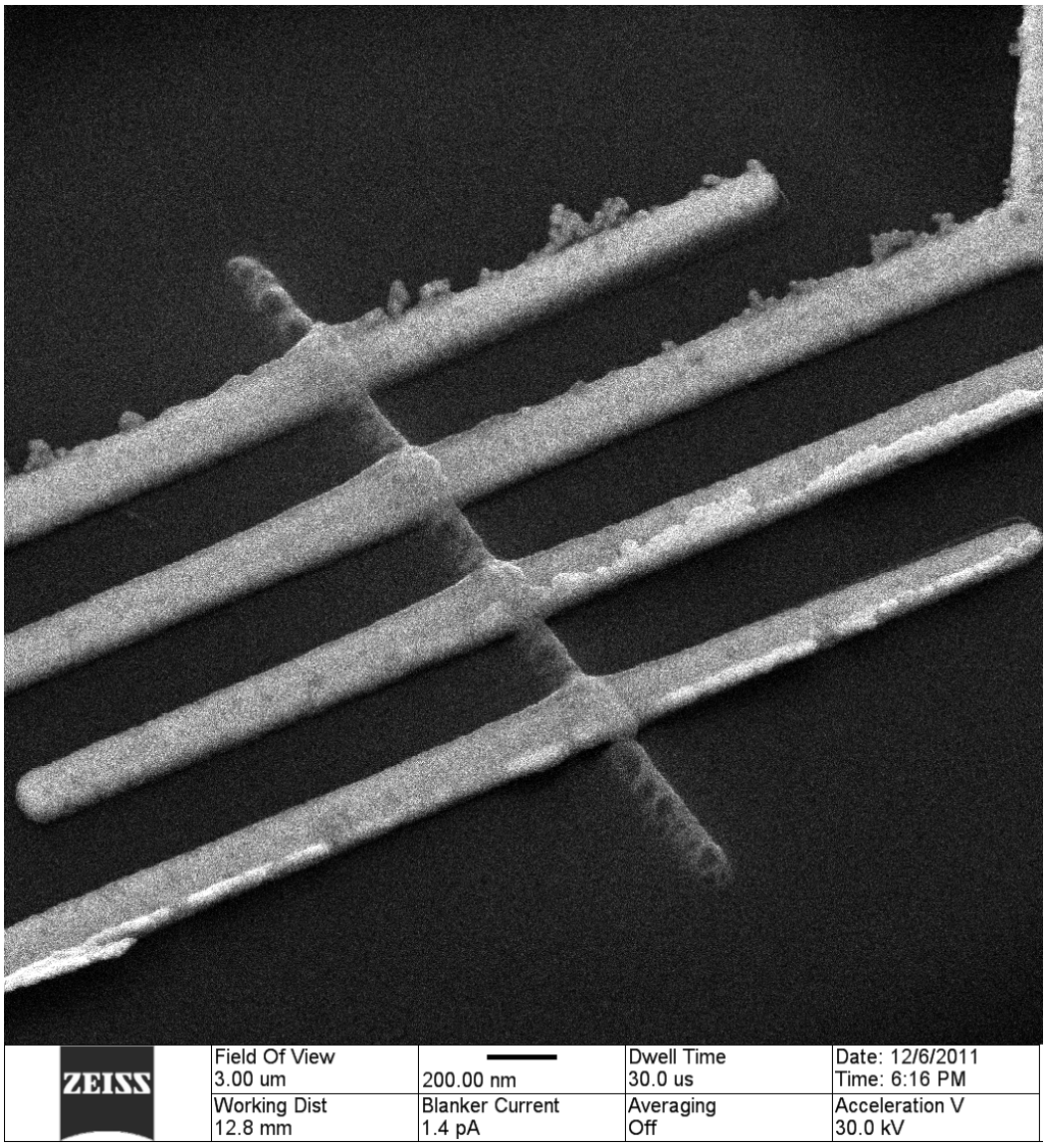

Figure 1: A micrograph of a Platinum wire deposited across a 4 point probe structure for measurement of bulk resistivity: Wires have been deposited using a 5pA Neon gas field ion source using Pt(C9H16Pt) precursor. Wire widths of 125nm have been deposited. The resistivity measures 896 μΩ-cm initially and reduces to 632 μΩ-cm after conducting current for a period of time.