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## Modeling on 2D Rapid Surface Oxidation by 1D Scanning Loop-type of Induction Thermal Plasmas

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Inductively coupled thermal plasma (ICTP) is widely adopted for various materials processing. However, the conventional cylindrical ICTP is hardly adequate to large-area materials processing. For the purpose of large-area surface modification using thermal plasmas, we developed a unique ICTP, i.e. a loop type of ICTP (loop-ICTP). It is formed in a loop quartz tube connected with a rectangular quartz vessel. A substrate is placed on the substrate holder located in the quartz vessel. Then, a part of loop-ICTP is formed directly lying on the substrate with a linear shape. In addition, scanning the substrate against the linear thermal plasma provides 2D rapid surface oxidation of the substrate.

In this paper, numerical modeling was made on two-dimensional rapid surface oxidation for a Si substrate by scanning loop-type of Ar-O<sub>2</sub> loop induction thermal plasma. The model is based on the 3D energy conservation equation to determine the substrate temperature, and the Deal-Grove model to obtain temporal variation in the thickness of oxide layer. As a result, almost uniform oxide layer can be obtained only by one scan of the 2-inch Si(100) substrate for one minute with oxidation rate of 100 nm/min.