ALD trend and its application to gate spacer and charge trap layer

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In this presentation, I will start with talking about the development direction of ALD technology and its application to gate spacer and charge trap layer. ALD technology has a classical time-divided ALD technology and new space-divided fast ALD technology. First, ALD technology using time-divided method started with thermal ALD technology, and developed to plasma ALD technology. In recent years, fast ALD technology using space-divided method to improve throughput, which is the biggest disadvantage of time-divided method, has been proposed, and many improvements have been made. Therefore, in this presentation, I will start with introducing the whole ALD technology in general, and I will take time to discuss what kind of ALD technology have been developed in the world, especially in Korea, and what kind of technology will be interested in the future. I will present the results of plasma ALD technology, which has been studied in my laboratory, and present the results of using this technology to apply as a gate spacer or charge trap layer.

In this study we used remote plasma ALD to develop SiN_x process and evaluated various precursors such as trisilylamine (TSA), bistertiarybutylaminosilane (BTBAS), tris[dimethylamino]silane (3DMAS), Trisisoprophylaminosilane (TIPAS), tetraisocyanatesilane (TICS), and bis(dimethylaminomethylsilyl)trimethylsilyl amine (called DTDN 2H2). And TSA and DTDN 2H2 precursors were intensively studied and evaluated the physical and electrical characteristics. We fabricated the MANOS structures to evaluate the device properties and used the TEM, XPS, AES, XRD, SIMS to examine the physical properties. Our main topics in this study is to apply the SiNx thin films for gate spacer and charge trap layer.