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# MAPS (Mecaro's Advanced Precursors System)-Ti Series: Atomic Layer Deposition of TiN or $TiO_2$ Films Using New Titanium Precursors

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Size decrease demand in semiconductor devices has been increased for the last few decades. A thinner barrier layer with high uniformity and conformality and also excellent step coverage is needed for optimum layer filling.[1] For these reasons, atomic layer deposition (ALD) has been introduced as a method to deposit conformal thin films in a structure having high aspect ratio, and the famous materials deposited by ALD are $Al_2O_3$, $HfO_2$, $ZrO_2$, ZnO, and TiN. Selection of appropriate precursor plays a critical role in the success of final ALD process since high temperature deposition is required, high thermal stability precursors are required as well. Titanium dioxide ($TiO_2$) is an attractive candidate for several thin film applications, such as high dielectric constant material for electronic devices. $TiO_2$ is also a constituent of several important multi-metal oxide systems, such as strontium titanates (STOs), barium strontium titanates (BSTs), and lead zirconium titanates (PZTs), for dielectric and ferroelectric applications.[2] ALD processes for producing metal containing thin films comprise feeding into a reaction space vapor phase pulses of metal containing cyclopentadienyl-based ligands precursors as a metal source material. The quest for alternatives to cyclopentadienyl-based ligands has led to *N*-centered donor ligands in various fields of organometallic and coordination chemistry.

In this work, series of titanium complex (MAP-Ti series) having amine derivative have been synthesized and characterized as new precursors for ALD. The one of these new compounds was found to have properties well-suited for use as precursors for ALD of thin films. It has high volatility, high thermal stability, and high reactivity. The experimental details of film deposition and characterization will be reported briefly.

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[1] (a) M. Ritala, *Appl. Surf. Sci.*, **1997**, *112*, 223.

(b) S. M. George, A. W. Ott, J. W. Klaus, *J. Phys. Chem.*, **1996**, *100*, *13*, 121.

[2] P. Alluri, P. Majhi, D. Tang, and S. K. Dey, *Integr. Ferroelectr.*, **1998**, *21*, 305.