**INTRODUCTION**

Magnesium oxide (MgO) is a moderately high dielectric constant material: 8-10, with a wide band gap: 7.8 eV. Potential applications include: gate insulator, buffer layer for superconductors and ferroelectrics, and high secondary electron emission film for plasma displays. MgO has been used extensively in microchannel plate amplifiers and channeltron technology.

**Precursor Synthesis and Properties**

The magnesium precursor is readily synthesized by the reaction of commercially available dibutyl magnesium with the free amine. The product is a colorless liquid which may be distilled at 80°C and 14mTorr. The amidinate and precursor are a racemic and diastereomeric mixture with one dominant diastereomer visible in the 1H NMR.

**ALD Growth Characteristics**

- All film depositions performed in an Arradiance GEM-D2 ALD system
- Films grown in a temperature range of 225 – 275°C
- Magnesium Bis(Di-secbutylacetamidinate) was used in a temperature range of 205-118°C and was directly dosed from a 150cc precursor delivery bottle
- H2O was used as the oxidant at the room temperature and was directly dosed to process chamber

<table>
<thead>
<tr>
<th>Precursor</th>
<th>Nominal Temp</th>
<th>Dose Time</th>
<th>Exposure Time</th>
<th>Purge Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2O</td>
<td>28°C</td>
<td>20ms</td>
<td>0.5s</td>
<td>70s</td>
</tr>
<tr>
<td>Mg(BuAM)(2)</td>
<td>109°C</td>
<td>1x (x2)</td>
<td>1.5s</td>
<td>30s</td>
</tr>
</tbody>
</table>

**Film Properties**

MgO was deposited on both Si and glassy carbon substrates. The composition of the films was measured using Rutherford Backscattering spectroscopy. A typical RBS plot is shown as well as a graph showing a decreasing O/Mg ratio with cycle number. Conformality was determined using fused silica capillary tubes and measuring the penetration of the film using an optical microscope.

**Electrical Measurements**

Electrical measurements made using NCV contain 0.1 x 390 mm². IV measurements using a Keithley 2400 and Microchannel Plate Probe station, CV measurements using HP 4275a LCR meter.

**References**