## a-Si:H Film, Grown using Unaxis ICP Deposition Tool, at Substrate Temperature of 90 °C*

<table>
<thead>
<tr>
<th>Pressure (mT)</th>
<th>Bias Power (W)</th>
<th>ICP Power (W)</th>
<th>Gas Flow Rate (sccm)</th>
<th>Deposition Rate (nm/min.)</th>
<th>Stress (MPa)**</th>
<th>Integrated Area under Stretching Mode (cm⁻¹)***</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>50</td>
<td>400</td>
<td>40</td>
<td>20</td>
<td>85.2</td>
<td>-676</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>50</td>
<td>400</td>
<td>10</td>
<td>17</td>
<td>-144</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>50</td>
<td>800</td>
<td>10</td>
<td>20.3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*: Using 5 mT, 100 W Bias Power in Plasma Ignition Step.
**: Negative sign means a compressive stress.
***: This integrated area under the Si-H stretching mode is proportional to the Hydrogen content in the film.

Figure 1 a) SEM picture of Film#1 with a growth condition of 1.5 mT, 50/400 bias/ICP Powers, and 40/20 sccm SiH₄(100%)/Ar flow rate (the film was grown on a layer of SiO₂, which itself was deposited on a Si substrate); b) FTIR Absorption Spectrum (the mode peaked at ~2100 cm⁻¹ is the Si-H Stretching one).
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(a) Corrected Absorbance (40 sccm 100% SiH4, 400 W ICP Power)

(b) Bottom Line

Wavenumbers (cm⁻¹)

Absorbance

1800 1900 2000 2100 2200 2300 2400 2500

Corrected Absorbance (40 sccm 100% SiH4, 400 W ICP Power)

Bottom Line
Figure 2 FTIR Absorption Spectrum of Film#2 with a growth condition of 1.5 mT, 50/400 bias/ICP Powers, and 10/20 sccm SiH₄(100%)/Ar flow rate (the mode peaked at ~2100 cm⁻¹ is the Si-H Stretching one).
Figure 3 SEM picture of Film#3 with a growth condition of 1.5 mT, 50/800 bias/ICP Powers, and 10/20 sccm SiH$_4$(100%)/Ar flow rate (the film was grown on a layer of SiO$_2$, which itself was deposited on a Si substrate).

**Conclusion:** The growth rate of a-Si film is proportional to the SiH$_4$ (100%) gas flow rate. The higher the film growth rate, the higher the compressive stress and the hydrogen concentration in the film.