Hardware Forecast, Manual Update

and Perspectives

Almost a Decade of AMS

<table>
<thead>
<tr>
<th>Date</th>
<th>Papers</th>
<th>AMS</th>
<th>Event</th>
<th>Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1</td>
<td>3</td>
<td>Beginning of &quot;project&quot;</td>
<td>Sizing initially based on electric deflection. Ceramic oven with W coil, UTI quadrupole.</td>
</tr>
<tr>
<td>1998</td>
<td>Laboratory version operating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>Designed vacuum system. First field deployment, Atlanta SOS</td>
<td></td>
<td>Extraneuclear quadrupole, flat plate vaporizer. Focused the development path for data acquisition.</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>1</td>
<td>3</td>
<td>Delivered first &quot;engineered&quot; version</td>
<td>8mm Balzers Quad. Inverted cone shaped vaporizer. Acquisition and Analysis software.</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>5</td>
<td>Sensitivity Improvements</td>
<td>16 mm Quad. Standard lens.</td>
</tr>
<tr>
<td>2002</td>
<td>3</td>
<td>6</td>
<td>Sensitivity Improvements</td>
<td>High efficiency ionizer, V301 pump introduced, Alcatel introduced</td>
</tr>
<tr>
<td>2003</td>
<td>9</td>
<td>11</td>
<td>“Issues” Collection efficiency, focusing</td>
<td>HP lens on last 2 of 11 units</td>
</tr>
<tr>
<td>2004</td>
<td>32</td>
<td>10</td>
<td>“Issues” Collection efficiency, bounce</td>
<td>Short chamber introduced</td>
</tr>
<tr>
<td>2005</td>
<td>22</td>
<td>6</td>
<td>Delivered first cTOF to Mainz</td>
<td>TOF introduced</td>
</tr>
<tr>
<td>2006</td>
<td>67 papers, 41 instruments built/delivered.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A project to develop an instrument for “lab use”

Building a technology through a community

Focus on quantification

New technologies, improve organic characterization. Quantification...
Where are we going…

- Understand/resolve quantification issues, $C_{E_{AMS}} (E_B, E_L, E_S)$
  - Lens systems, vaporizer, RIEs (interpretation of ORG spectra)

- Develop new instrument versions
  - Time-of-Flight systems (new acquisition and analysis efforts)
  - Aerosol Chemical Speciation Monitor (ACSM)
  - Aerosol Collector Module (ACM)

- Develop new add-ons
  - Light scattering module
  - Soft ionization modes
  - PM2.5 lens (high pressure lens)

How are we going to get there?

- Diversification of technology
  - AMS vacuum system
  - TOF spectrometer/Acquisition hardware
  - Acquisition and analysis software
  - Addressing quantification “issues”

The AMS Community…
What’s new with hardware

- Compact TOF (cTOF), high resolution TOF (wTOF)
- PM2.5 lens (high pressure lens)
  - Characterization of existing Standard and HTP lens
- Characterization of new oven materials and geometries.
- Software interface/control for pumps and electronics.
- Pumps
  - Retire Alcatel
  - V81 Varian to be released

Biggest Issue is Quantification factor of 2 or CE=0.5

- Particle focusing/divergence
  - Lens performance
- Particle Bounce
  - Light scattering probe and BWP results
  - Vaporizer
- Relative Ionization Efficiencies
Q-AMS Manual

- On-line pdf version almost complete (~100 pgs).
- Focus has been to simplify and provide more troubleshooting and repair information.
- Software acquisition and analysis to be covered separately.