

## ***Symposium on Coating Advances and its Impact on the Future of the Vacuum Coating Industry***

This symposium takes a critical look at the future of vacuum coatings for industry. The goal of this symposium topic is to give guidance to our industry and scientific members as to what the future may hold from the viewpoint of needs of certain applications and market growth. It will identify market leaders, both from a corporate and research view and will explore new markets which are poised for growth and markets seeing decline. Overall, our industry appears to have a promising future with a projected growth of thin film technology in the fields of flexible electronics, solid state lighting, displays, photovoltaics, batteries, new fuels and storage, optics, biomedical and aerospace. Furthermore, the sessions will identify emerging vacuum processes, such as HIPIMS and compare with existing PVD processes. This featured topic investigates non-vacuum coating technologies, such as atmospheric plasma deposition, spray technologies and inkjet and how they compete with vacuum based technologies. The outcome of these sessions will give direction for our industry and our Society as a whole. The organizers solicit papers on the following subjects:

### ***Business, Market and Workforce***

- *The health of the vacuum coatings industry (2011-2020), current markets and market share: the projected future markets and market share by 2020 for vehicles, marine, aerospace, buildings, electronic, energy, health, industrial and consumer applications*
- *Where is venture and corporate capital moving?*
- *Geographical manufacturing: Who does the coating and where will the future coating plants be located?*
- *How will the U.S. coatings industry be affected by environmental legislation? Case studies from Europe and Asia*
- *Where will the jobs be and how do we educate for the future?*
- *Vision of the equipment manufacturers, coating facilities and end users*

### ***Changing Core Markets and its Effect on Traditional Vacuum Coating***

- *How will the future change the mix and needs of vacuum coating?*
- *What are the general future needs of industry, equipment, vacuum environment, analysis, speed, coating area, quality, cost, process temperature and process control?*
- *Vacuum evaporation including arcs*
- *Sputtering (all types)*
- *PECVD*
- *Ion Beam Deposition (all types)*

### ***Characteristics of Emerging Markets***

Where are the emerging markets, the role of coatings and who are the market leaders? What coating research problems need solutions for the following subjects:

- *New energy sources and fuels*
- *Energy storage*
- *Environmental*
- *Lighting*
- *Flexible electronics*
- *Health and the aging society*

### ***Role of New PVD Processes***

- *Developing PVD technology compared to existing technologies: advantages and disadvantages*
- *What is the current status and maturity?*
- *Adoption by manufacturers – how far out into the future?*
- *Are any of these new technologies potential game changers? What are the future needs of this technology?*
- *Who are the Corporate, University and Government Institute leaders for new coating processes?*

- HIPIMS
- ALD
- other new PVD

### ***Non-Vacuum Processes Competition and Synergy with Vacuum Deposition***

There are several deposition technologies that challenge vacuum based processes. In actual manufacturing there are a variety of processes, both vacuum and nonvacuum, that are used to manufacture complete products. In this topical group we look at non-vacuum processes such as atmospheric plasma, inkjet, printing, CVD, sol gel and plating technologies. For each technology we want to determine its role and market potential in overall coating technology. As we move towards new product concepts such as polymer electronics, thin film batteries and organic solar cells we wish to know which deposition technologies are favored.

- *How do non-vacuum coatings compete or complement vacuum coatings and their future outlook?*
- *Are any of these non-vacuum technologies disruptive technologies to vacuum based techniques?*
- *Adoption of new deposition processes by manufacturers by what time and rate of adoption?*
  - *Atmospheric plasma*
  - *Inkjet printing*
  - *CVD*
  - *Sol gel*
  - *Electroplating and electroless plating*

The rapidly advancing field of Atmospheric Plasma Technologies is an important subtopic in this Symposium. Besides the favorable economic aspects, the main advantage of these coating technologies is removal of space limitations given by vacuum chambers, which allows treatments of virtually unlimited substrate areas. Although the focus is mainly in non-thermal plasmas suitable for treatment of webs and temperature sensitive substrates including human skin, there are numerous innovations made recently also in thermal plasma technologies. Another important option is utilization of atmospheric microplasmas in treatment of local surfaces and the production of nano-scaled surface objects and structures. We therefore expect exciting contributions in the sub-session on "Atmospheric Plasma Technologies".

*Symposium Organizers: Clark Bright, 3M Company (520/746-7061; [cibright@mmm.com](mailto:cibright@mmm.com)); Carl Lampert, Star Science (707/794-0333; [cmlstar@sonic.net](mailto:cmlstar@sonic.net))*

*Symposium Contributors: Frank Zimone, Angstrom Sciences, Inc.(856/938-9653; [fzimone@angstromsciences.com](mailto:fzimone@angstromsciences.com)); Ludvik Martinu, École Polytechnique de Montréal, Canada (514/340-4099; [ludvik.martinu@polymtl.ca](mailto:ludvik.martinu@polymtl.ca)); David Glocker, Isoflux Incorporated (585/349-0640; [dglocker@isofluxinc.com](mailto:dglocker@isofluxinc.com)); Geoff Ringer, 3M Corporate Process Research Laboratory (520/746-7066; [gringer@mmm.com](mailto:gringer@mmm.com)); and Chris Stoessel, Southwall Technologies (707/525-8874; [stoessel@attglobal.net](mailto:stoessel@attglobal.net)). Atmospheric Plasma Process Organizers: Ladislav Bárδος, Uppsala University, Sweden (46/18-4713034; [ladislav.bardos@angstrom.uu.se](mailto:ladislav.bardos@angstrom.uu.se)) and Hana Baránková, Uppsala University, Sweden (46/18-4713118; [hana.barankova@angstrom.uu.se](mailto:hana.barankova@angstrom.uu.se)).*