



**Integrated  
Surface  
Technologies**



## **Surface Modification** for Life Sciences

Future innovations in bio-devices require precise control of surface properties. With state-of-the-art semiconductor electronic process control, molecular films can now be deposited in your lab or factory by using IST's sub-atmospheric vapor deposition equipment. The system can provide every level of surface engineering required for the bio-tech industry. From bench top systems for R&D and pilot production, to full size manufacturing tools, IST supplies equipment, chemistry, expertise and services to your organization.

### **Typical Applications**

- Silane Surface Modification
- Non Binding Surfaces
- DNA Micro-array preparation
- Biocompatible surfaces over Metals and Polymers
- Hydrophilic  $\mu$ -fluidic films
- Hydrophobic protection films
- Adhesion promoters
- Atomic Layer Deposition (ALD) of inorganic oxides



200mm wafer cassette in Model -210

### **Process Control**

- Accurate precursor delivery creates superior monolayers. Our surface modification is achieved by precise control of the vapor partial pressure, or by sequential and alternating surface limited half-reactions.
- IST's open architecture allows users to create their own, novel multi-layer nano-composite structures.
- IST's cartridge design\* provides easy chemical change-over for multiple applications in the same system.

### **The IST Advantage**

- Process Flexibility
- Superior Uniformity
- Repeatability: within substrate, substrate-to-substrate, batch-to-batch
- Lowest Cost-of-Ownership (COO) in the industry
- Large batch processing
- Efficient and minimal chemical usage with no liquid chemical waste-stream

Surface engineering requires stringent control of the precursor delivery and process parameter programming. **With IST's control system you can easily tune the process for your specific application.**

## Low Temperature / Sub-Atmospheric Processing

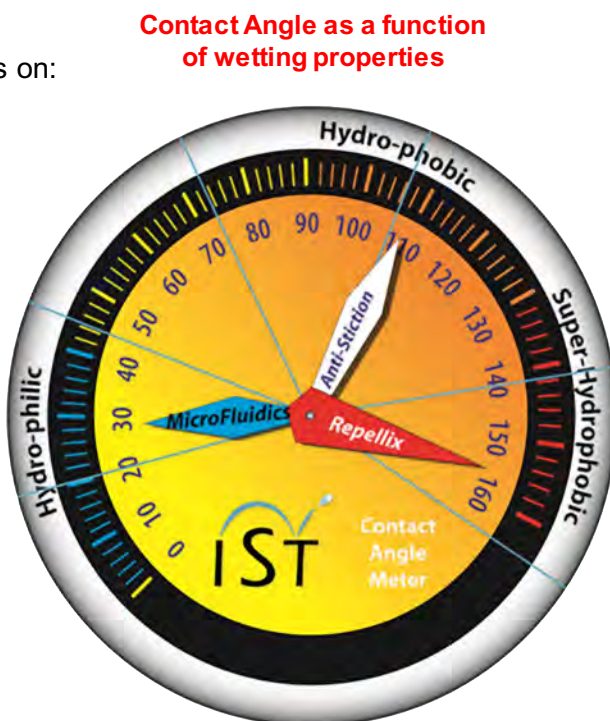
The IST RPX technology centers around the low temperature vapor deposition of reactive chemicals onto plastics, polymers, glass, metals and other bio-desirable classes of materials. In combination with plasma pre-treatments and vacuum degassing, the RPX system is capable of achieving ideal surface preparation for the pre-deposition of surface reactive chemicals. Traditional vapor prime ovens require high heat to control moisture.

IST's sub-atmospheric deposition guarantees repeatable, particle free surfaces, which are critical in many Life Science applications. When compared to liquid processing, the IST equipment reduces the overall cost, and produces no residual solvent waste stream.

Deposit Special Organic films on:

- Silicon
- Oxide
- Glass
- Steel and other metals
- Polyimides
- Aluminum
- Other Materials

- Coating of Plastics and Polymers.
- Improved Adhesion with deposited oxide primer layers.
- ALD thin metal oxides.

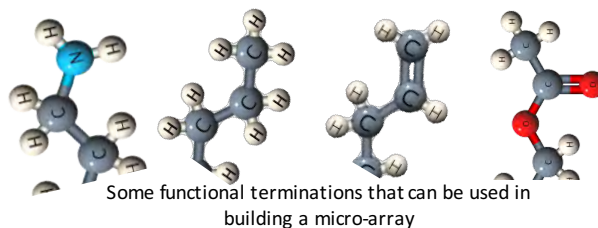
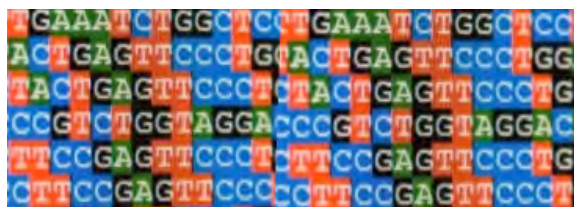


- Low Cost.
- Minimal chemical consumption.
- No Liquid disposal waste stream.
- One-button operation.
- Repeatable Vacuum Processing.
- Excellent Uniformity.
- Particle Free Depositions.
- Eliminates process variations from Moisture and other ambient conditions.
- Low maintenance and excellent equipment availability.
- Sequential processing from an Excel spreadsheet for custom engineered films.

**With today's advanced bio-devices, critical control of surface properties, using active and passive surface chemistry is often the key to success. Vapor surface modification technology allows for the complete engineering of the surfaces, with molecular precision.**

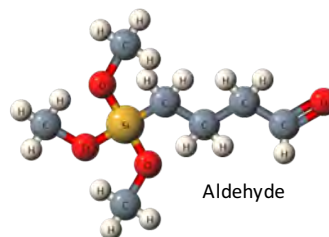
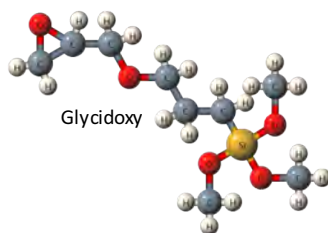
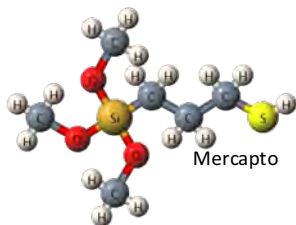
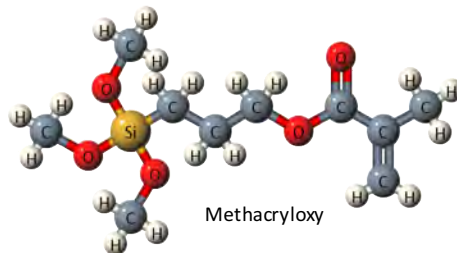
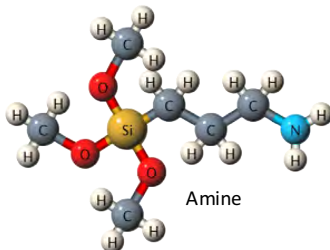
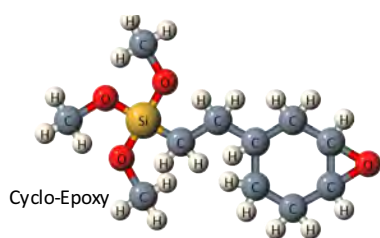
## Genomics Research

Genome Microarrays have enabled researchers and medical clinicians to identify human disease markers, gene defects, drug targets, as well as the identification of active and repressive cellular pathways. Active surface chemistry is key for the creation of specialized arrays or Bio-Chips for studies in cancer, epigenomics, immunology and in stem cell and synthetic biology.



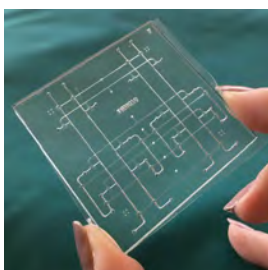
## Coupling Agents for General or Specific Binding

Coupling agents are intermediary bi-functional organic monolayers with specific reactive end-groups. The silanes used have surface reactivity for adhesion, and a specific functional termination for coupling. These silanes can be deposited over complex surfaces with excellent uniformity. Silanes can be combined with primer layers of silicon oxide or metal oxides to promote adhesion to a variety of different surfaces.

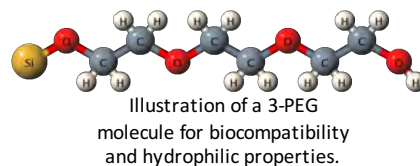
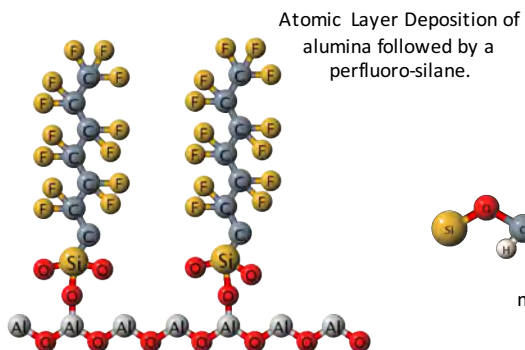


## Micro-Fluidics

Microfluidic devices are becoming the core in advanced diagnostic and therapeutic applications. As the feature sizes decrease, the control of surface properties in terms of wetting and bio-compatibility is essential. Surface treatments which are conformal, thin, and biocompatible are necessary to make the micro-fluidic devices functional. By using Atomic Layer Deposition (ALD) techniques of sequential depositions, surface coatings can be deposited into surface channels with limited access.

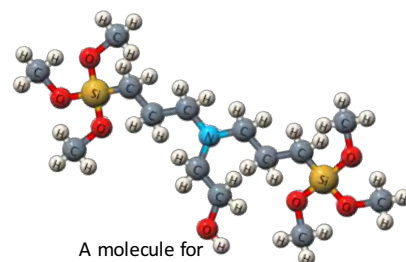
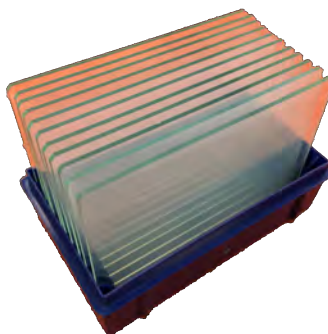
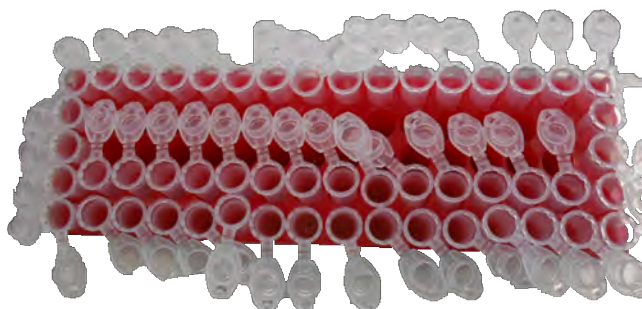


Plastic micro-fluidic device channels made Hydrophilic



## Bio-Consumables

Substrates (e.g. treated glass) and other bio-consumables are most active when the chemistry is “fresh” producing uncompromised or non-questionable results. Create your own surfaces with superior homogeneity and low background noise levels. With the in-situ deposition of primer layers, create the same functionalities on plastic and disposable media as you would on glass, to save cost. Deposit your own custom chemistry or choose from many industry standard precursors.

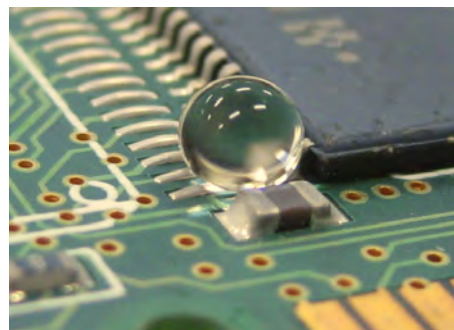
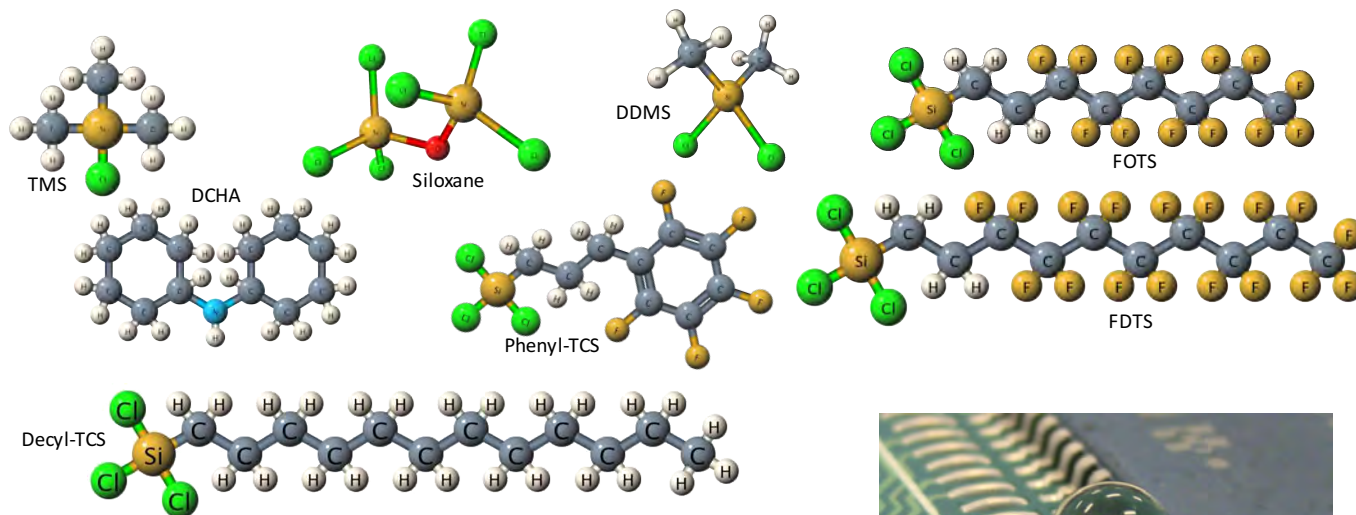


A molecule for anchoring an amine to the surface.

# Advanced Surface Modification

Biomedical applications require control of the surface energy. Both perfluorinated and hydro-carbon alkyl-chain silanes are commonly used. With our unique ability to control surface water which is critical to the chemical reaction, IST is capable of using chloro-silane terminated precursors. These types of precursors provide excellent results with rapid processing times and good throughput because of their high reactivity. Methoxy- and Ethoxy- silanes are also commonly used and readily available.

Films with various water contact angles can be deposited ranging from super-hydrophilic ( $<10^\circ$ ) to super-hydrophobic ( $>170^\circ$ ) using various surface treatments and chemicals. (Contact angles are an indication of the surface energy.)



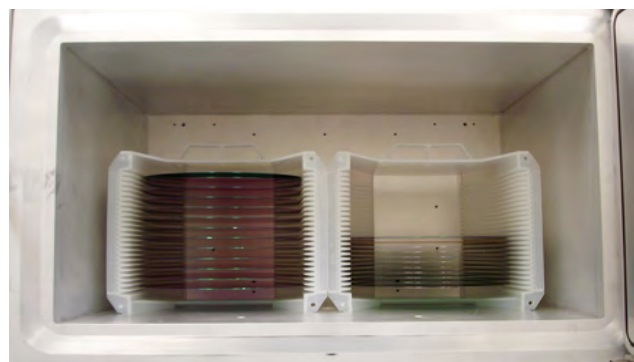
A super-hydrophobic nano-composite\* film deposited over a printed Circuit Board.



**Bench Top Model -210**  
2 Liquid Sources  
w/RF Plasma



**Production Model -560**  
5 Liquid Sources  
w/RF Plasma



**Large Batch Production Capability.**  
Model-540 with two 200mm wafer cassettes

\* IST's Vaporix Cartridge system allows for easy change over and low cost refills.



**Integrated Surface Technologies, Inc.**  
1455 Adams Dr., Suite 1125, Menlo Park, CA 94025 650-324-1824  
[sales@insurftech.com](mailto:sales@insurftech.com) [www.insurftech.com](http://www.insurftech.com)