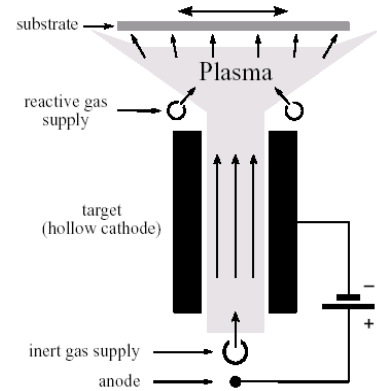


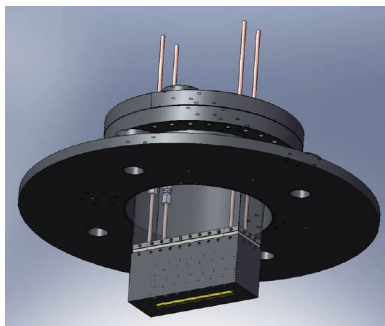
Gas Flow Hollow Cathode:

Gas Flow Hollow Cathode (GFHC) Sputter Deposition has been shown to be ideal methodology for depositing a wide range of materials that benefit from high deposition rates, low deposition energy, and low substrate temperature. The low deposition energy and substrate temperature reduce coating defects as compared to conventional sputtering and allow deposition on plastics. Gas flow through the cathode protects the cathode from the reactive gases introduced into the chamber and allows reactive deposition of metal compounds, like oxides, nitrides, selenides, and tellurides, with deposition rates competitive with the deposition rates of bare metals. The GFHC is also applicable to pure metal depositions.

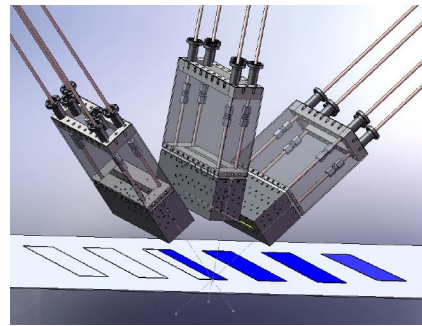


Gas Flow Hollow Cathode

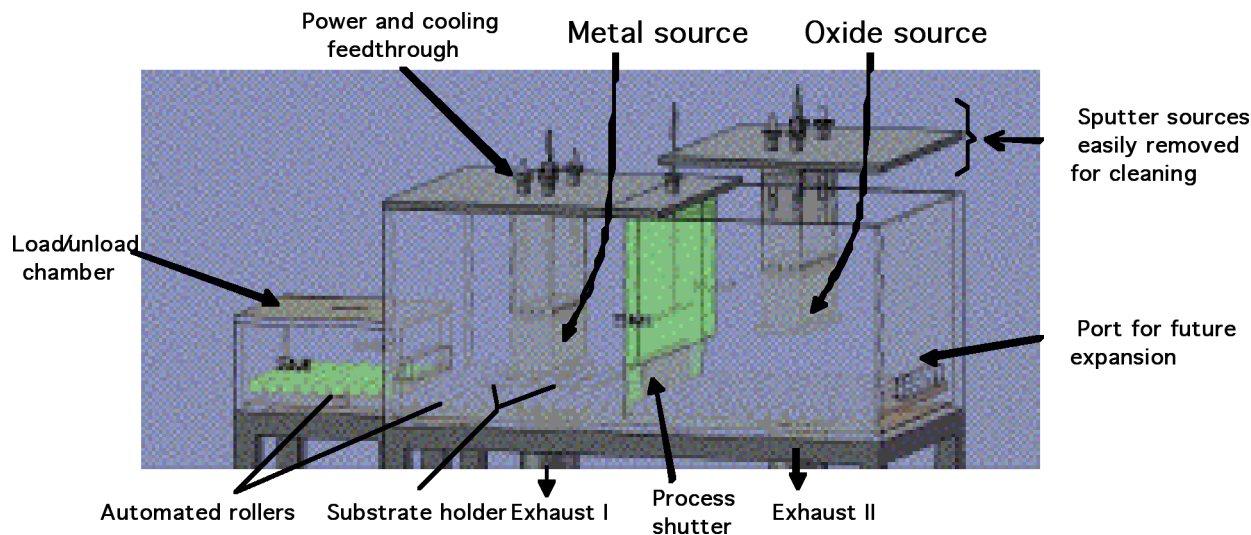
Material System	Applications	Applications	Substrates
Transparent Conductive Oxides (TCOs): ZnO, ZnMgO, ITO, CuAlO	Photovoltaics Displays, Sensors Electrochromics Solid State Lighting (LEDs)	Lowdefects Low substrate temperature and High deposition rates, Large Areas	Si, GaAs, Glass, GaN, Polymer, Plastics, Metal foils
Thermoelectrics (TEs): SiGe, Si	Solid State Cooling, Conversion of heat into electricity	Superlattices of Polycrystalline material at low temperatures	Polymers, Semiconductor wafers
Metals and Alloys: Many	Decorative coatings Semiconductors, Electro-optics, Contact layers in general	High Deposition rates, Low temperatures	Polymers, Ceramics, Semiconductor wafers
Amorphous hydrocarbons (without and with metal): Me-C-H	Tribological Coatings	Low substrate temperature and high deposition rates	Polymers, Turbine blades, Tools
Oxides in general: ZrO ₂ , TiO ₂ , Al ₂ O ₃ , PZT, BST, YBCO, and so on	Dielectrics, Ferroelectrics, Tribological, Passivation, Protective coating on Implants (Dentistry), Optical/Antireflection coating, Superconductors	Low substrate temperature, Large area	Glass, Polymer, MEMS/actuators, Disks, Semiconductors wafers, Sensors, Medical components, Tools, and so on
Magnetic materials (for example): SmCo	Soft and hard magnetic films	High deposition rate	Thin film sensors microactuators



Single Source Heads



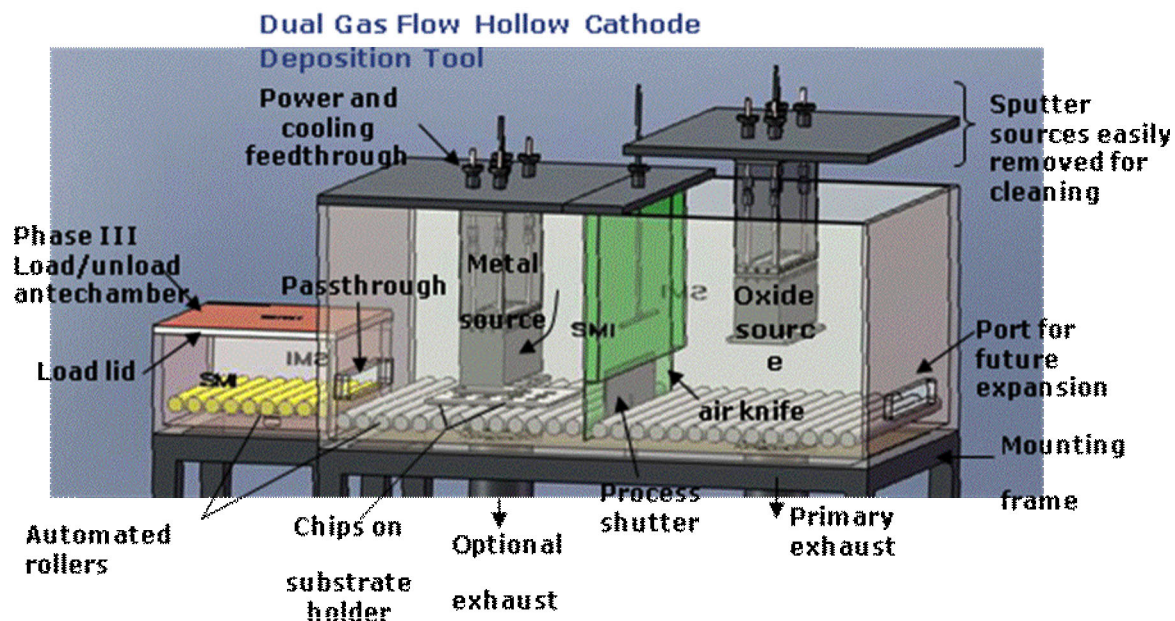
Multiple Source Heads



Gas Flow Hollow Cathode Sputter Systems

Features

- Low Temperature Operation – allows deposition on polymers
- Low (< few eV) energy – minimizes sputter induced defects – improves device performance
- High deposition rates – increases productivity
- Linear scalability – in-line and wide substrates – through one meter



Structured Materials Industries, Inc.