PPD PULSED PLASMA DEPOSITION
a revolutionary technique for thin film deposition

Materials:

- Transparent conducting oxides
- II-VI semiconductors
- Ceramic oxides
- Diamond like carbon
- Ultra high k dielectrics
- Carbides
- Nitrides
- III-V semiconductors
- Colossal magnetoresistance
- High Tc superconductors

Applications:

- Flexible displays
- Transparent electronics
- Spintronics
- Magnetic coatings
- Thin film photovoltaics
- Wide area photodetectors
- Hard and wear resistant coatings
- Decorative coatings
- Hybrid capacitors
- Insulating layers
- Photonic devices
## PPD characteristics

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<tr>
<td>Energy (J)</td>
<td>2-3</td>
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<tr>
<td>Growth rate (nm/s)</td>
<td>0.001-10</td>
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<td>Repetition rate (Hz)</td>
<td>1-50</td>
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<td>Beam power density (MW/cm²)</td>
<td>500</td>
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<td>Energy efficiency</td>
<td>&gt; 30%</td>
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<tr>
<td>Scalability</td>
<td>Up to 4 PPD guns (in operation) R. to R. in progress</td>
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<td>Suitable for transparent materials</td>
<td>Yes</td>
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Thin films made by the PPD

- Transparent Conducting Oxides (TCO) (ITO, IMO, ZnO, etc.)
- Multi layer thin film solar cells (CdS, CdTe, Sb₂Te₃, CuInSe₂, etc.)
- High TC superconductors (YBCO, Tₚ > 92K, Iₗ = 2-4 × 10⁶ A/cm²)
- CMR manganites (Tₚ = 350 K, 100% spin polarized at room temperature)
- Ultra high k dielectrics (BST, STO, etc.)
- Buffer layers (AlOₓ, TiOₓ, CeOₓ, SrTiO₃, BaF₂, etc.)
- High bandgap materials (SiOₓ, etc.)
- Biocompatible materials (quaternary SiO₂- CaO- P₂O₅- Na₂O system)
- Organic materials (teflon, polyethylene, etc.)
- Hard and wear resistant coatings (SiC, TiN, Diamont like carbon, etc.)
PDP IN BRIEF

PDP is a revolutionary new physical vapour deposition (PVD) technique proved to deposit thin films of numerous materials such as oxides, complex oxides, nitrides, carbides, carbon based films, semiconductors, etc.

PDP produces a pulsed high density electron beam (500 MW/cm²) which, by interacting with the target, causes material ablation independently of the energy gap (i.e. the optical absorption) of the target itself.

The chemical composition of the target is transferred to the substrate by a supersonic highly energetic plasma giving rise to thin films of materials otherwise impossible to grow with conventional PVD and CVD techniques. The PDP process is a low temperature process with unparalleled possibilities for the growth of hetero-multilayer structures and for the deposition on delicate surfaces.

PDP guns are available for a variety of thin film fabrication processes including a bake-able version.

We provide several PDP systems for the academic as well as for the industrial market. The area of deposition on the substrate varies from one to four inches diameter for different PDP systems equipped by one, two and six guns.

An industrially oriented Reel to Reel system for the deposition of one inch wide ribbon is under construction and will be available on the market on the second quarter of 2009.

Various accessories have been designed to allow the in-situ remote control of temperature, plasma composition and thickness.

COMPANY PROFILE

Organic Spintronics srl (OS) is a spin-off company of the Italian National Research Council (CNR), Bologna Division, which has developed into a private company. ISMN-Bologna is ranked among the top ten European centers of excellence in nanotechnology.

(see: http://europa.eu.int/comm/research/era/mapping-excellence.html).

The OS mission is to develop and commercialize innovative thin film deposition processes and equipments based on proprietary IP's. OS possess also the principal IP assets on materials and processes for the development of organic spintronics, a new area of science invented by Prof. Carlo Taliani in 2001.

OS employs 14 technical and scientific personnel and has registered over 300% growth in turnover in the last two years.

Areas of activity are:
- Setting up thin film fabrication processes of innovative materials by the Pulsed Plasma Deposition (PPD) technique.
- Development and commercialization of innovative equipments for the fabrication of thin films by the PPD.
- Development and commercialization of industrial PPD fabrication equipments.

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