Applied MicroStructures, Inc.

Nano-scale Surface Engineering with Molecular Vapor Deposition (MVD®)

1020 RINCON CIRCLE, SAN JOSE, CA 95131
• PHONE: (408) 907-2885 • TOLL FREE: (877) MVD-AMST • FAX: (408) 907-2886
WWW.APPLIEDMST.COM

MVD® Systems & Films - The Right Choice

- Advanced, production proven technology
- Established record of substantial yield increase
- Extremely low cost of ownership
- Multiple film types produced in a single system
- Ultra-thin SAM, CVD, and ALD type films
- Batch or single substrate processing (able to process full cassette of 6” or 8” wafers)
- Small footprint and simple facilitization
- Outstanding uniformity and conformality
- Low temperature processes (35°-150℃)
- Reliable systems that are simple to operate
- Worldwide installed base
- None of the drawbacks of typical fab tools

Process Services Available

To date, AMST has processed millions of MEMS, InkJet, BioTech, and other devices for our customers in our Applications Lab in California

AMST provides process services for customers who want the benefits of our MVD® films but do not have the capacity for a system

MVD® film types

- Hydrophobic / hydrophilic
- Oleophobic / oleophilic
- Self-healing
- Lubricant / Anti-stiction
- Low temperature oxide
- Corrosion resistant
- Moisture / Gas barrier
- Adhesion promoting / priming
- Release layer
- Bio-compatible / bio-reactive
- Functionalized
- Conformal / 2000:1 aspect ratio
- Low particle / production worthy

Substrate & Material options

- Silicon
- Metals (Al, Ti, Cr, Au, Cu, etc.)
- Oxides (SiO_2, SiNx)
- Glass and Acrylics
- Polycarbonates
- Polystyrene
- Poly-propylene
- PMMA
- PDMS
- SU-8 / Photoresists

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AMST MVD® Systems

AMST has an installed base of nearly 60 systems worldwide: Belgium, China, Denmark, France, Germany, Japan, Korea, the Netherlands, Puerto Rico, Saudi Arabia, Taiwan, and the USA

The MVD100E for R&D Applications & Pilot Production

The MVD150 for High Volume Manufacturing

Feature	MVD100E-4	MVD150-4
Process Chamber Temperature Range	35 to 100°C	35 to 150°C
Line Temperature Range	35 to 100°C	35 to 150°C
Source/Supply Temperature Range	35 to 120°C	35 to 15 0°C
Process Chamber Dimensions	10.40" L x 11.70" W x 3.00" Deep (With Liners) 11.10" L x 12.40" W x 3.25" Deep (Without Liners)	10.25"H x 13.40" W x 10.00" Deep
System Dimensions cm (Inch) H x W x D with doors closed	137 x 122 x 76 (54 x 48 x 30)	185 x 122 x 107 (72.76 x 48 x 41.63)
Approximate Weight kg (lbs)	363 (800)	546 (1200)
High Temperature Capacitance Manometer - Chamber	Standard	Standard
Siemens PPC67715T HMI Interface	Standard	Standard
Enhanced Temperature Control ± 5℃	Standard	Standard
Productivity Software	Standard	Standard
Heated Chamber N2	Option	Standard
Automation	Not Available	Optional
Degas	Standard	Standard
Process Capabilities	MVD: SAM, CVD-type, ALD-type	MVD: SAM, CVD-type, ALD-type
Particle Control	Not Available	Standard
Enhanced Maintenance Design	Standard	Standard

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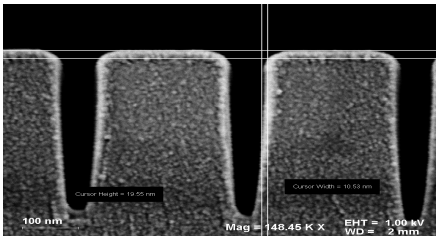
Why coat your devices with AMST's MVD® Films?

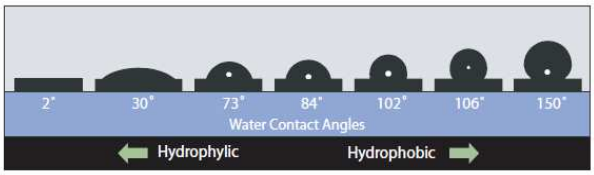
Remarkable Anti-Stiction Films

MEMS Device	Coefficient of friction	Work of adhesion (mJ/m2)
Uncoated	1.1	20000
AMST Coated	0.2	3

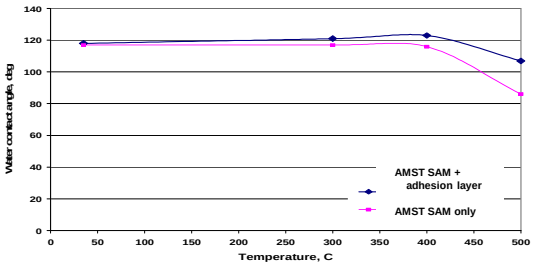
Exceptional Conformality



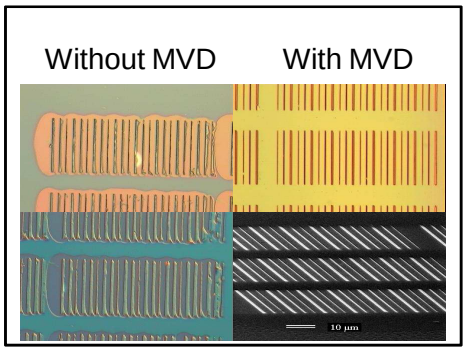
Tunable Surface Properties



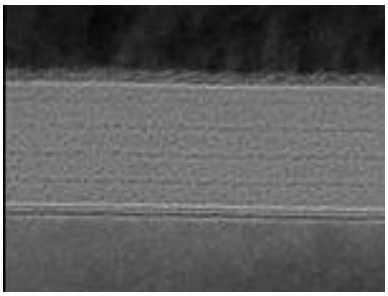
Excellent Thermal Stability



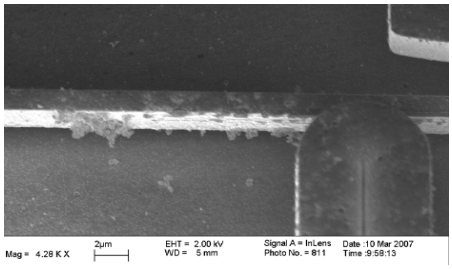
Significant NIL Improvement



Effective, Low-Temp. Barrier Films



Outstanding Wear Resistance



Liquid-Phase Deposition VS. Molecular Vapor Deposition (MVD)

Very low Cost of Ownership = Fast ROI

- Multiple Tools
- High Labor Costs
- High Chemical Usage
- Chemical Disposal Risks

$9 / wafer

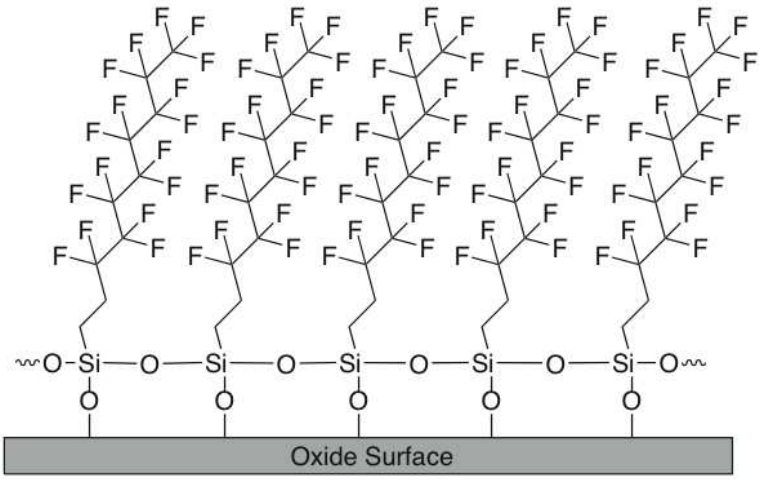
- Small Footprint
- Automated with High MTBF
- Ultra-Low Precursor Usage

18¢ / wafer

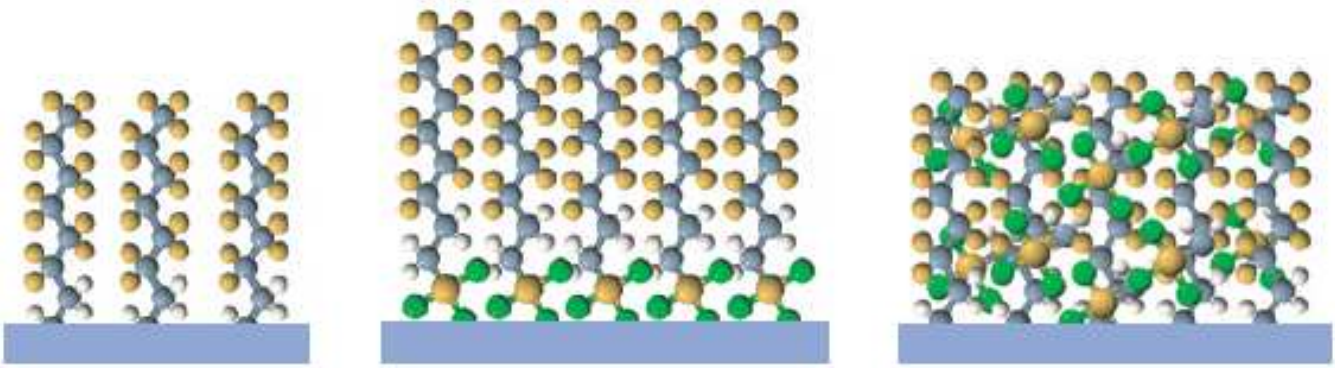
*Costing provided by MEMS customer

What is MVD®?

Molecular Vapor Deposition (MVD®) is a patented method of generating low temperature, vapor deposition films for anti-stiction, hydrophobic, hydrophilic, adhesion, biocompatible, protective, or reactive films



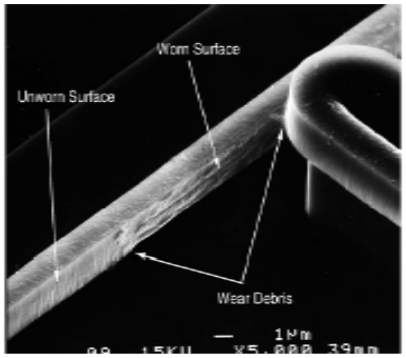
Applied MicroStructures' MVD® systems can be used to create complex, high performance film composites (SAM films, ALD-type films, and CVD-type films) all in the same system and in sequence

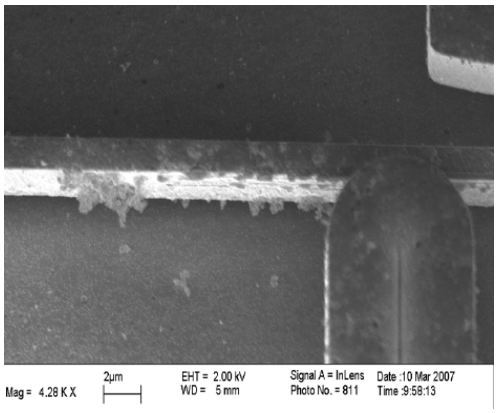


This technique is used for MEMS, Nano-Imprint Lithography, Inkjet printing, Life science, and Bond Pad protection applications worldwide

MEMS: Yield Enhancement

Cantilever Beam Wear Testing

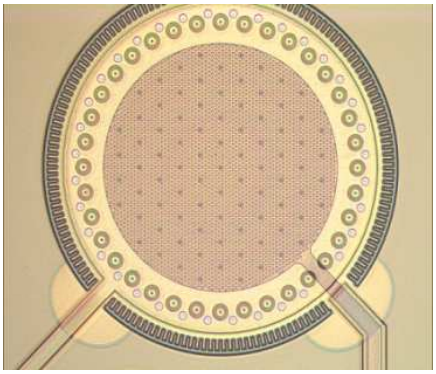




Sample	Lifetime (cycles)
No coating	6.70E+03
AMST – MVD®	>1.0E+8

High-G shock Tests Results
(MEMS microphones)

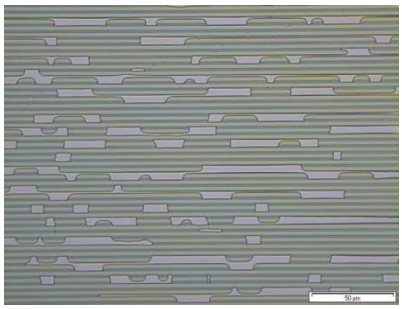
Coating	Percent Failures
None	14%
AMST – MVD®	<0.4%

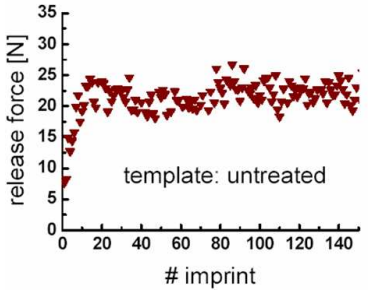


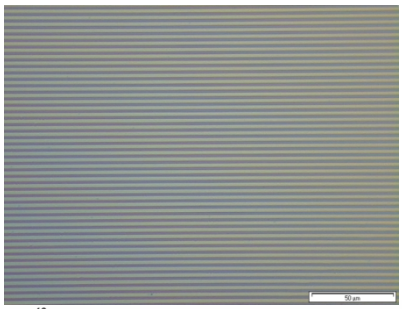
KNOWLES ACOUSTICS

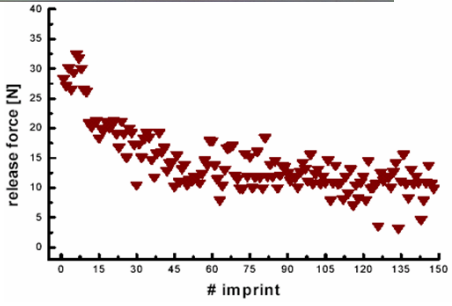
NIL: Enabling Technology

Untreated









Treated

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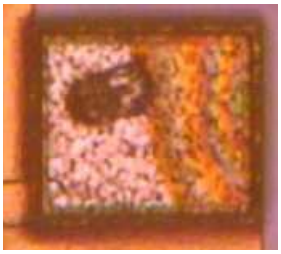
Bond Pad Corrosion Protection

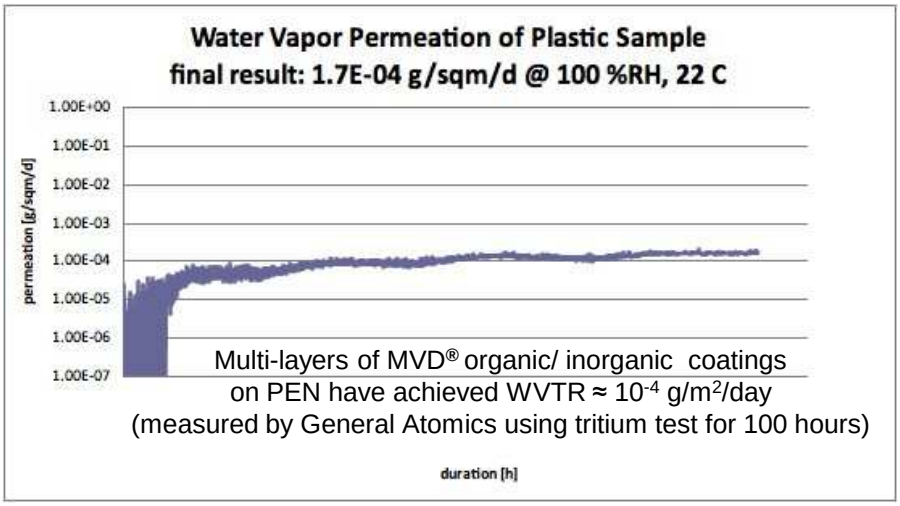


Uncoated

MVD® Coated

- Ultra-thin (20-200Å) coating
- No masking or stripping required
- Wire Bond through the MVD film
- No degradation of bond strength
- Low temperature process

Moisture Barriers

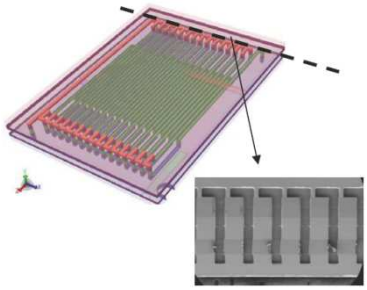


Multi-layers of MVD® organic/ inorganic coatings on PEN have achieved WVTR ≈ 10^{-4} g/m^2/day (measured by General Atomics using tritium test for 100 hours)

Life Science Applications

Coat interior channels of Microfluidic Devices

Functionalized Films For BioMEMS Applications



Hydrophobic Films to Protect Hearing Aids and Implants

Antistiction Films for Intraocular Lenses

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Want more Information?

For additional information or to submit samples for demonstration, please contact AMST directly at:

Applied MicroStructures, Inc.
1020 Rincon Circle
San Jose, CA 95131
1-408-907-2885
www.info@appliedmst.com

Or contact our Regional Sales/Service Offices

North America and Canada:
Sales and Service, Inc.
17853 Santiago Blvd.
Bldg. 107, Suite 333
Villa Park, CA. 92861
Ph: (714) 696-5332
email: info@salesandserviceinc.com

Korea:
Woowon Technology Co., Ltd.
1903 Parkview Office Tower, 6
Jeongja-dong, Bundgang-gu Seongnam-si,
Kyeonggi-do, Korea 463-863
Ph: 82-(0)31-783-4770
e-mail: www.wwtech.co.kr

UK, Ireland:
Scotech Ltd.
Netherton Road
Langbank, Scotland PA14 6YG
Ph. +44(0)1475 540689
Fax. +44(0)1475 540206
e-mail: mail@scotech.ltd.uk

Japan:
Inabata & Co., LTD.
2-8-2 Nihonbashihoncho,
Chuo-ku, Tokyo
103-8448, Japan
Ph: 81-3-3639-6545
www.inabata.co.jp

Denmark, Finland, Iceland, Norway, Sweden:
Advanced Vacuum Scandinavia AB
Industrrigatan 21, 234 35,
Lomma Sweden
Ph. +46 40 534070
Fax. +46 40 411318
e-mail: sales@advanced-vacuum.se

Austria, Benelux, Germany, Switzerland, and the countries of Eastern Europe:
NOVEL Technology Transfer GmbH
Dorfstrasse 16
D-85235 Pfaffenhofen a.d. Glonn
Ph. +49(0) 8134 55700-0
Fax. +49(0) 8134 55700-10
e-mail: max.wanninger@novel-tec.de

Israel:
PicoTech LTD
3 Ben Gurion St. P.O.B 2227
Kfar-Azar 55000 Israel
Ph: 972-3-6356650
Fx: 972-3-6357750
e-mail: www.picotech.co.il

Italy:
Gambetti Kenologia Srl
Via A. Volta n°27
20082 Binasco Milano (Italy)
Ph. +39 02 9052778
Fax. +39 02 9052778
e-mail: sales@gambetti.it

Taiwan:
Ultra-Pro International Co. LTD.
13F-10, No. 79, Sec. 1, Hsichih City
Taipei County, Taiwan, R.O.C.
Ph: 866-2-8698-3338
Fx: 866-2-8698-3339
e-mail: www.ultrapro.com.tw

Singapore & Malaysia:
Link Fab Technologies Pte Ltd.
627A Aljunied Road #06-05 BizTech Centre
Singapore 389842
Ph. +65 6745 0605
Fax. +65 6742 0605
e-mail: Sales@linkfab.com.sg

www.appliedmst.com