FUJIFILM
I&I–Imaging & Information

Fujifilm NANO CUBIC Coating Technology -Potential For 1TB Data Storage Tapes and 3GB Flexible Magnetic Disks

Mike McCorkle
Fuji Photo Film U.S.A., Inc. - Computer Products Division
555 Taxter Road - Elmsford NY 10523

e-mail: mike_mccorkle@fujifilm.com
Phone: +1-800-755-3854 x1281

Presented at the THIC Meeting at the Hilton San Diego/Del Mar
Del Mar CA 92014-1901
on January 22, 2002

NANO^3(NANO CUBIC) Technology

Fujifilm NANO CUBIC Coating Technology - Potential For 1TB Data Storage Tapes and 3GB Flexible Magnetic Disks

THIC Conference
Del Mar, California
January 22, 2002

Mike McCorkle - National Technical Support Manager
Fuji Photo Film U.S.A., Inc. - Computer Products Division
555 Taxter Road - Elmsford, NY 10523

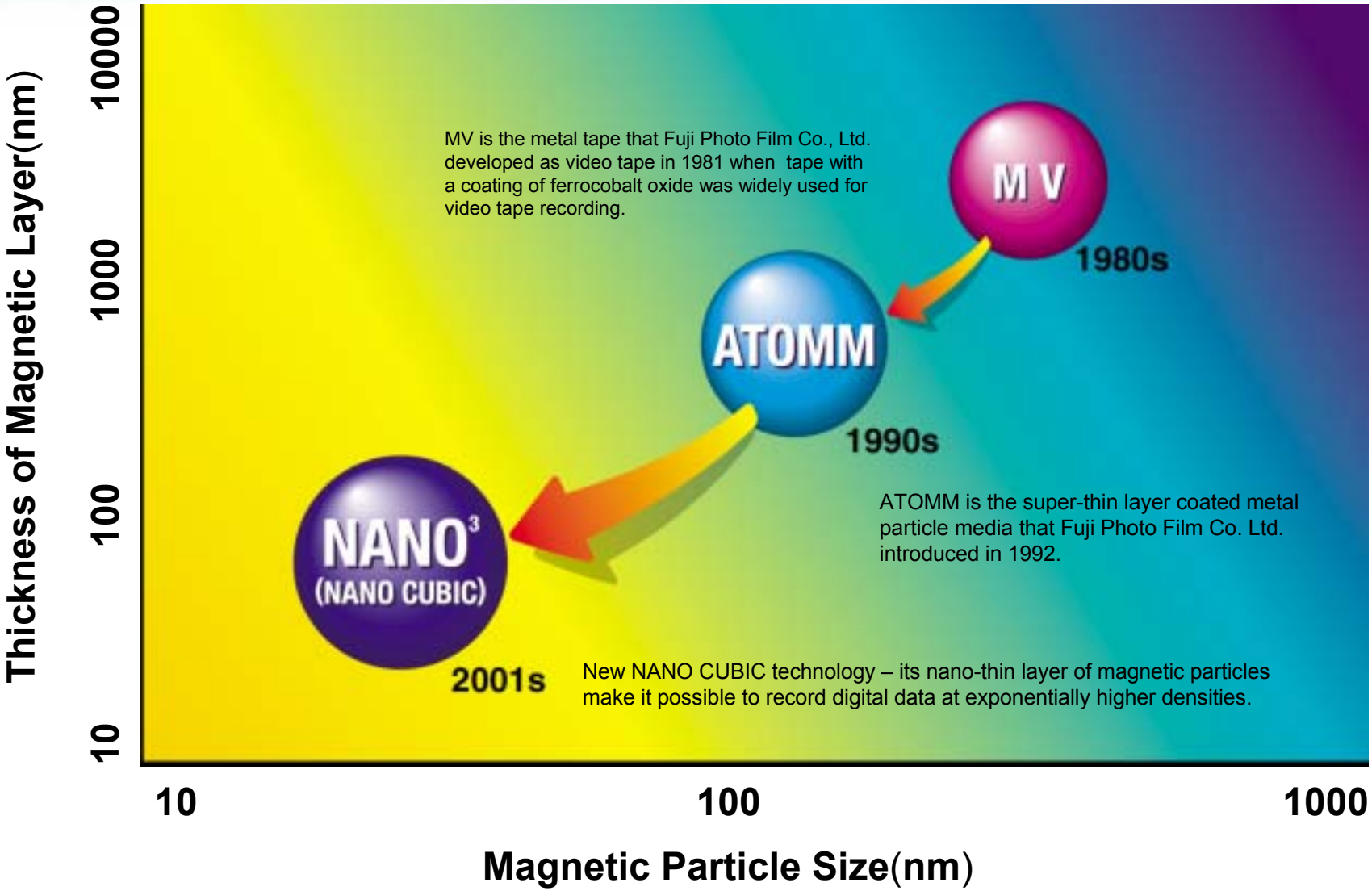
e-mail: mike_mccorkle@fujifilm.com
Phone: 800-755-3854 x1281

Web Site: fujifilmmediasource.com

FUJIFILM
I&I–Imaging & Information

Fig. 1

Technology change to NANO³ (NANO CUBIC) technology



FUJIFILM
I&I–Imaging & Information

Fujifilm NANO^3(NANO CUBIC) Technology

- NANO CUBIC technology is an ultra-thin layer coating that results in higher resolution for recording digital data, ultra-low noise and high signal-to-noise ratios that are ideal for magneto-resistive (MR) heads.

- NANO CUBIC Coating Technology has one-tenth the thickness of current magnetic layers with more than 10 times greater recording densities - potential for 1TB data storage and digital video tapes, plus 3GB magnetic flexible disks.

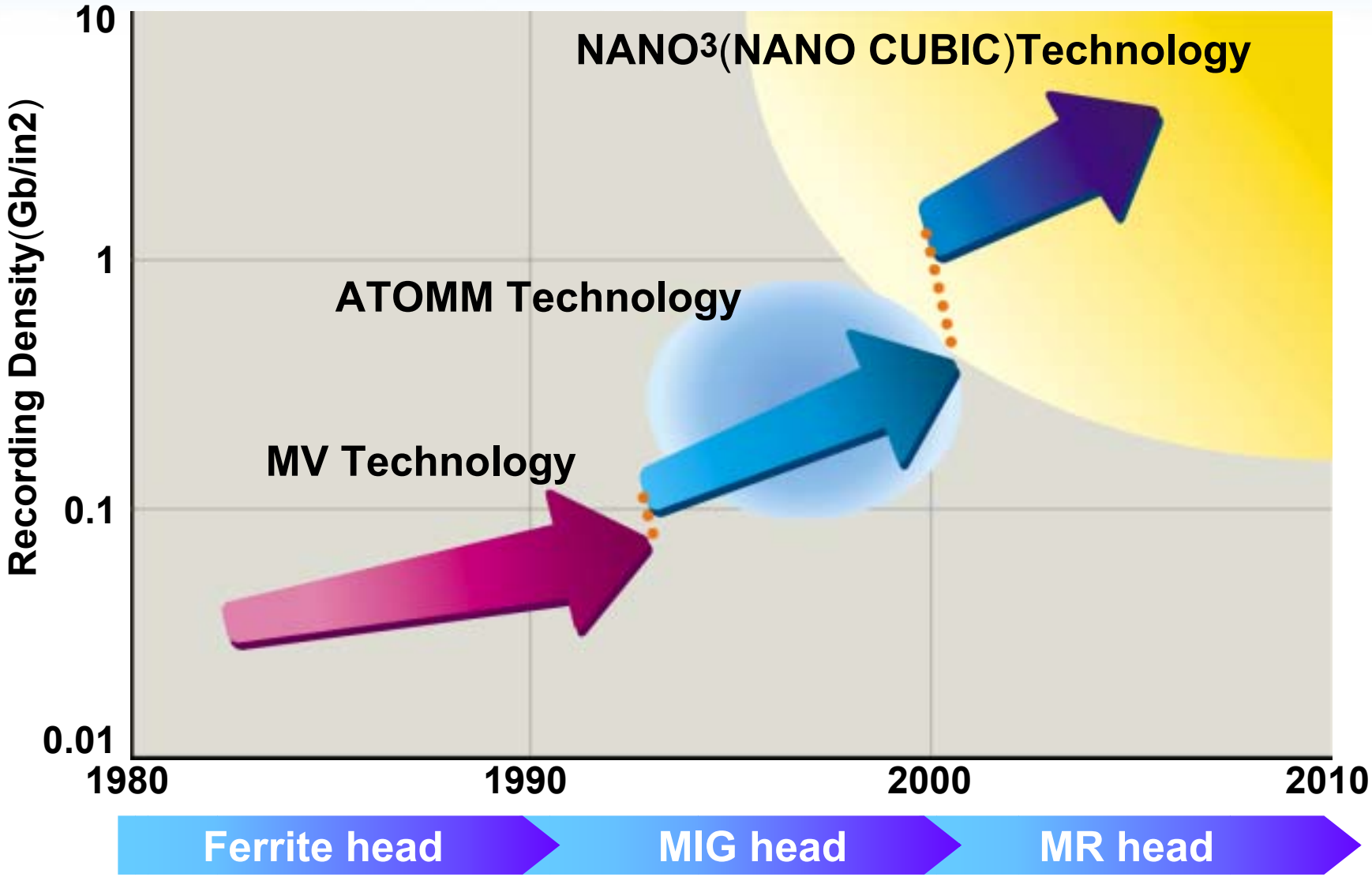
- Fujifilm will continue to develop ATOMM technology products for use in inductive-head *and* MR-head systems. NANO CUBIC technology products will be developed for MR, GMR and TMR head systems.

- NANO CUBIC coating technology can be applied cost-effectively to mass production manufacturing processes, requiring only small modifications to current ATOMM Technology coating equipment.

FUJIFILM
I&I–Imaging & Information

Fig. 2

Evolution of Recording Density with Magnetic Layer Coated Recording Medium



FUJIFILM
I&I–Imaging & Information

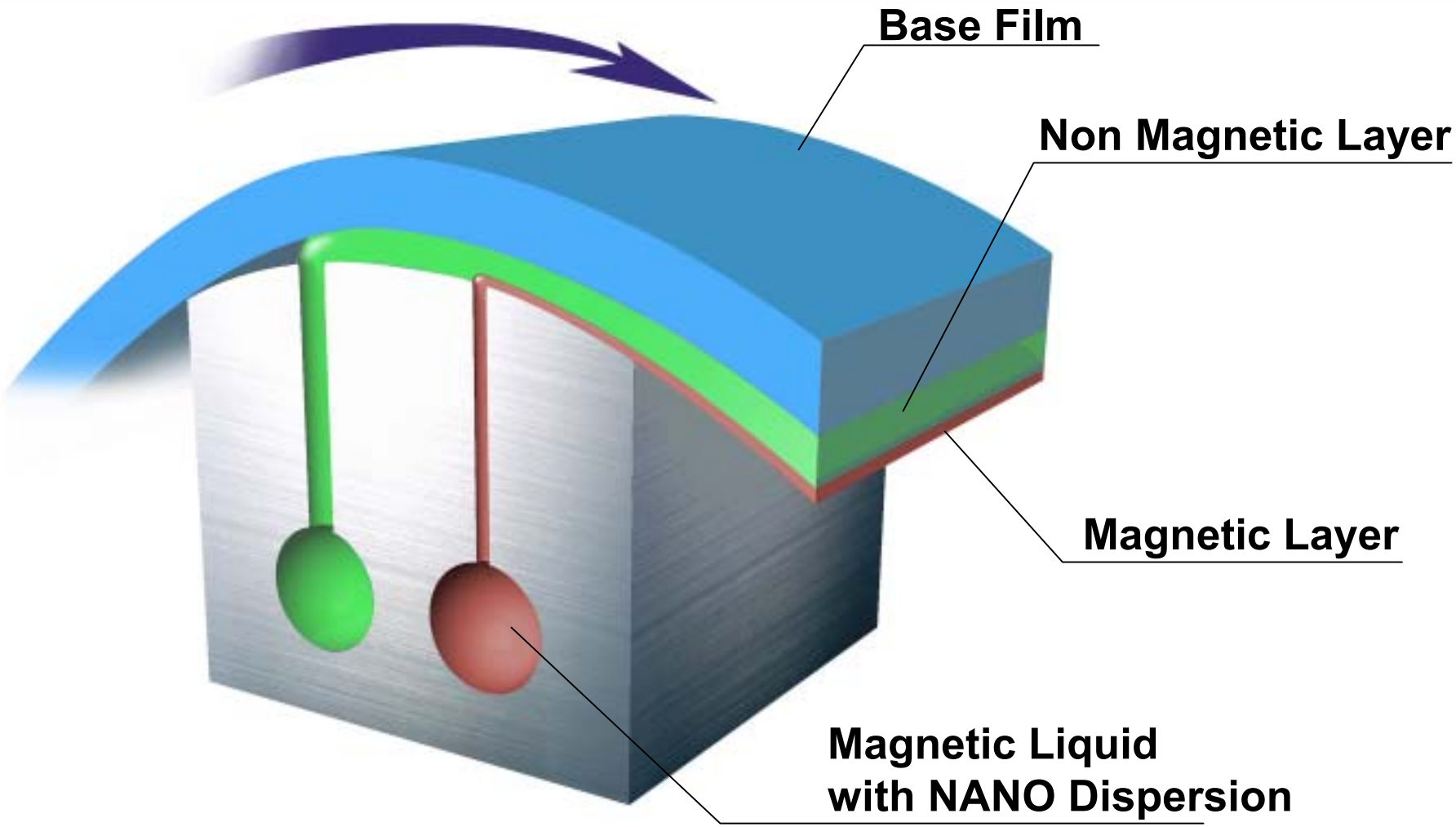
Three Technologies of NANO^3 (NANO CUBIC) Technology

- **NANO Coating Technology:**
  - NANO CUBIC technology employs an advanced precision coating process that can control the thickness of the magnetic layer on a nanometer scale.
- **NANO Particle Technology:**
  - Two types of magnetic particles were developed for NANO CUBIC technology, both tens of nanometers in size:
    - **acicular ferromagnetic alloy particle**
    - **tabular ferromagnetic hexagonal barium ferrite particle**
- **NANO Dispersion Technology:**
  - NANO CUBIC technology uses a special organic binder material that has the ability to thoroughly disperse particles in the coating solution so that a uniformly packed structure of the layer is realized.

FUJIFILM
I&I–Imaging & Information

Fig. 3

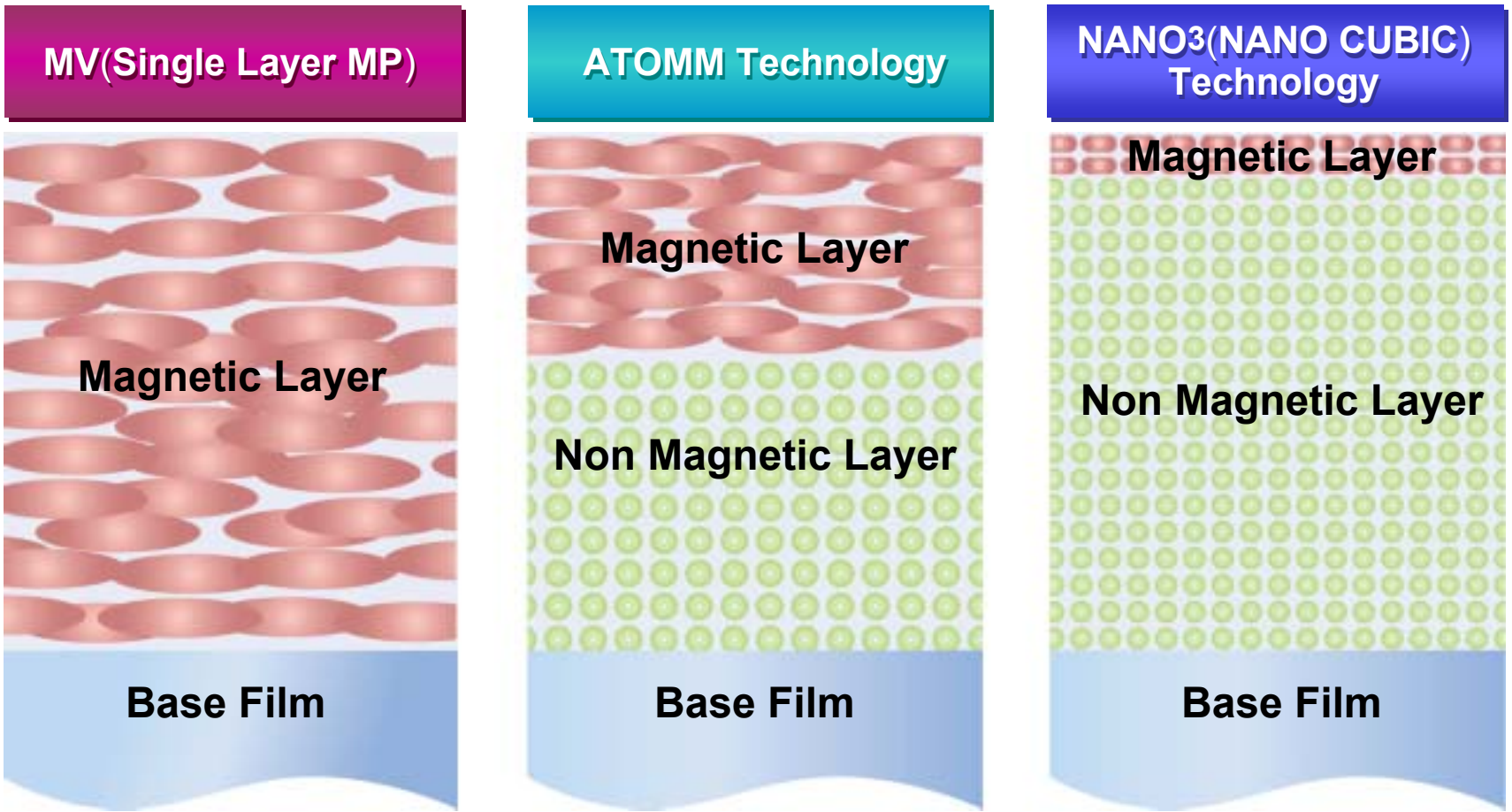
NANO Coating



FUJIFILM
I&I–Imaging & Information

Fig. 4

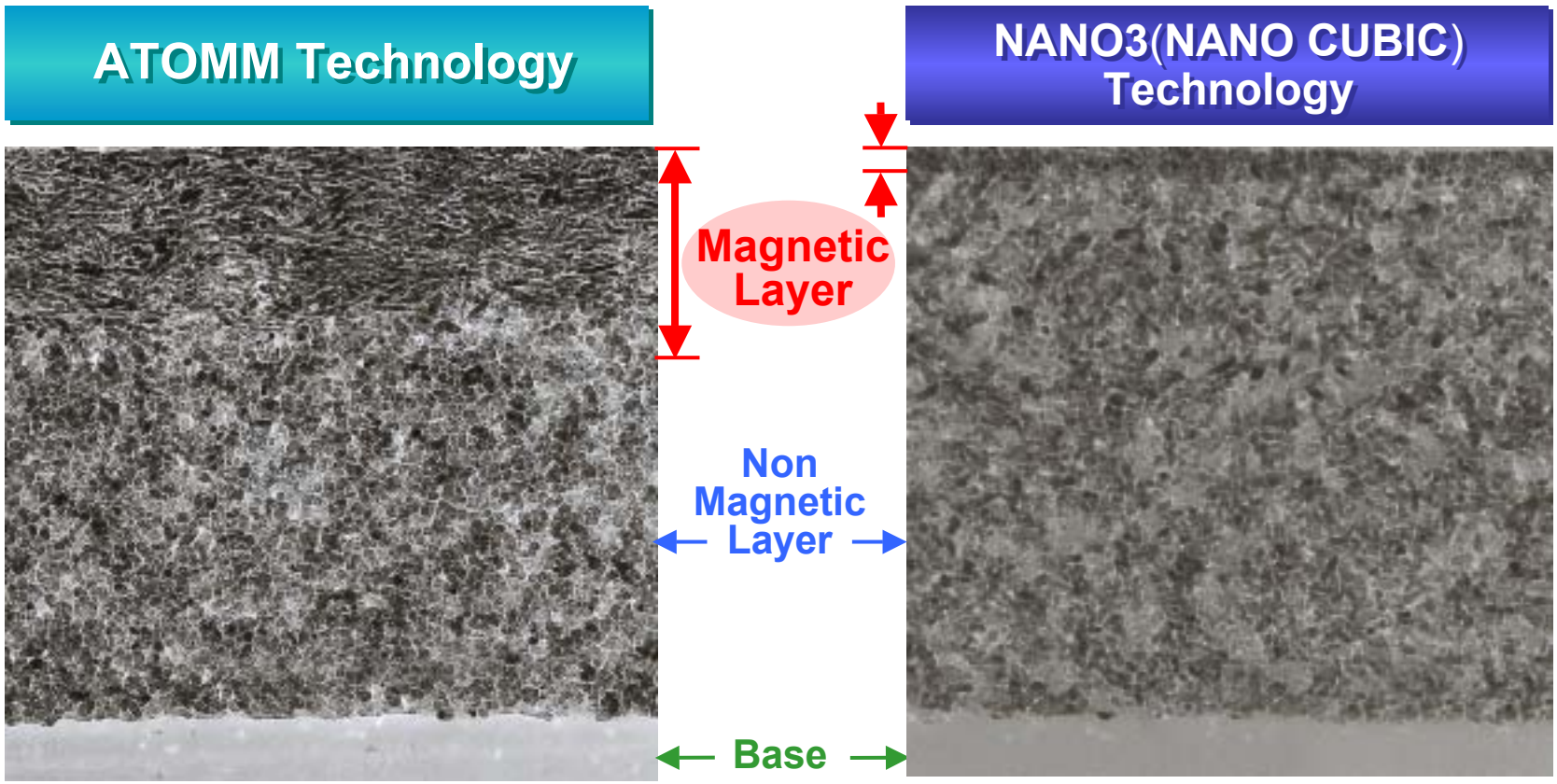
Construction of NANO^3(NANO CUBIC) Technology



FUJIFILM
I&I–Imaging & Information

Fig. 5

Photograph of Cross-Section of Tape

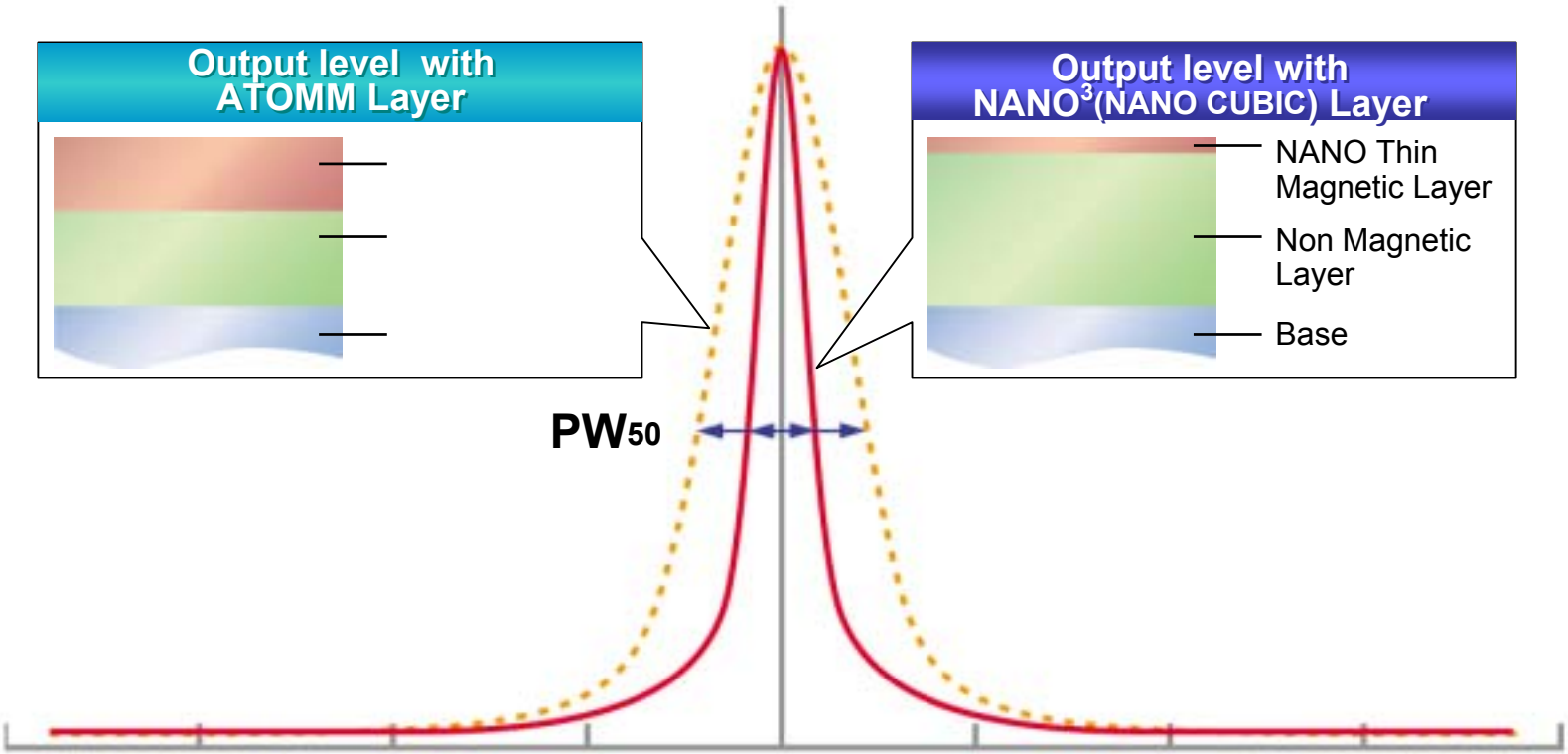


FUJIFILM
I&I–Imaging & Information

Fig. 6

High Resolution

- In order to achieve high density recording, the isolated pulse shape must be very sharp, produce little jitter and have a narrow width at its 50% threshold (PW_{50}).
- PW_{50} is reduced by using a very thin magnetic layer.



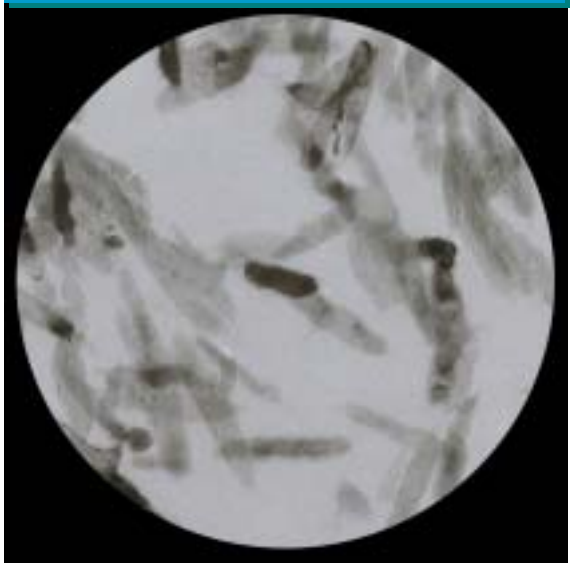
FUJIFILM
I&I–Imaging & Information

Fig. 7

Photograph of Magnetic Particle

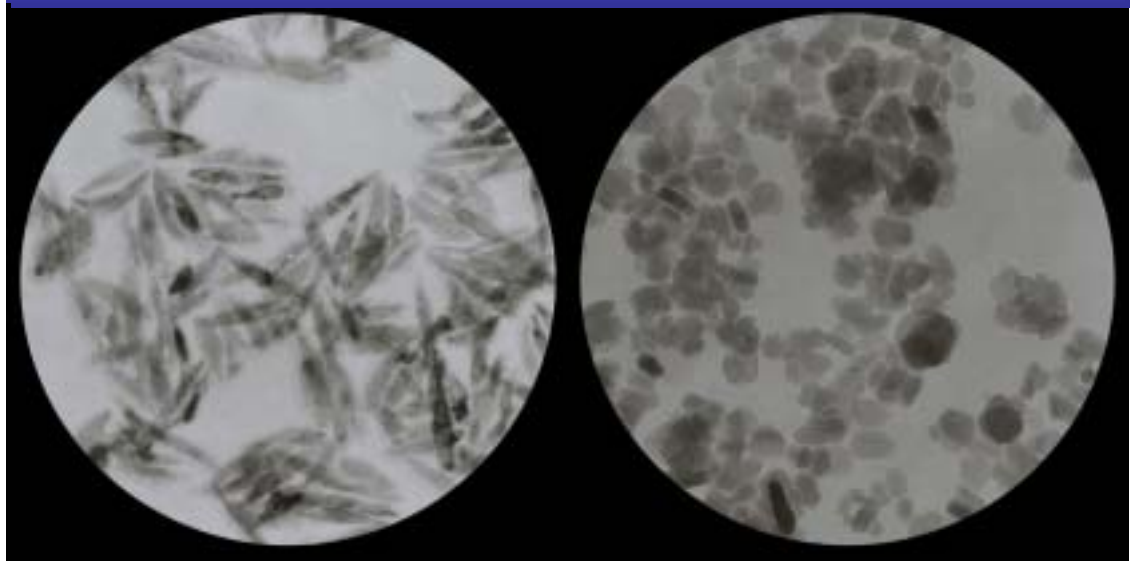
ATOMM Technology

MP



NANO³(NANO CUBIC)Technology

MP | Barium ferrite

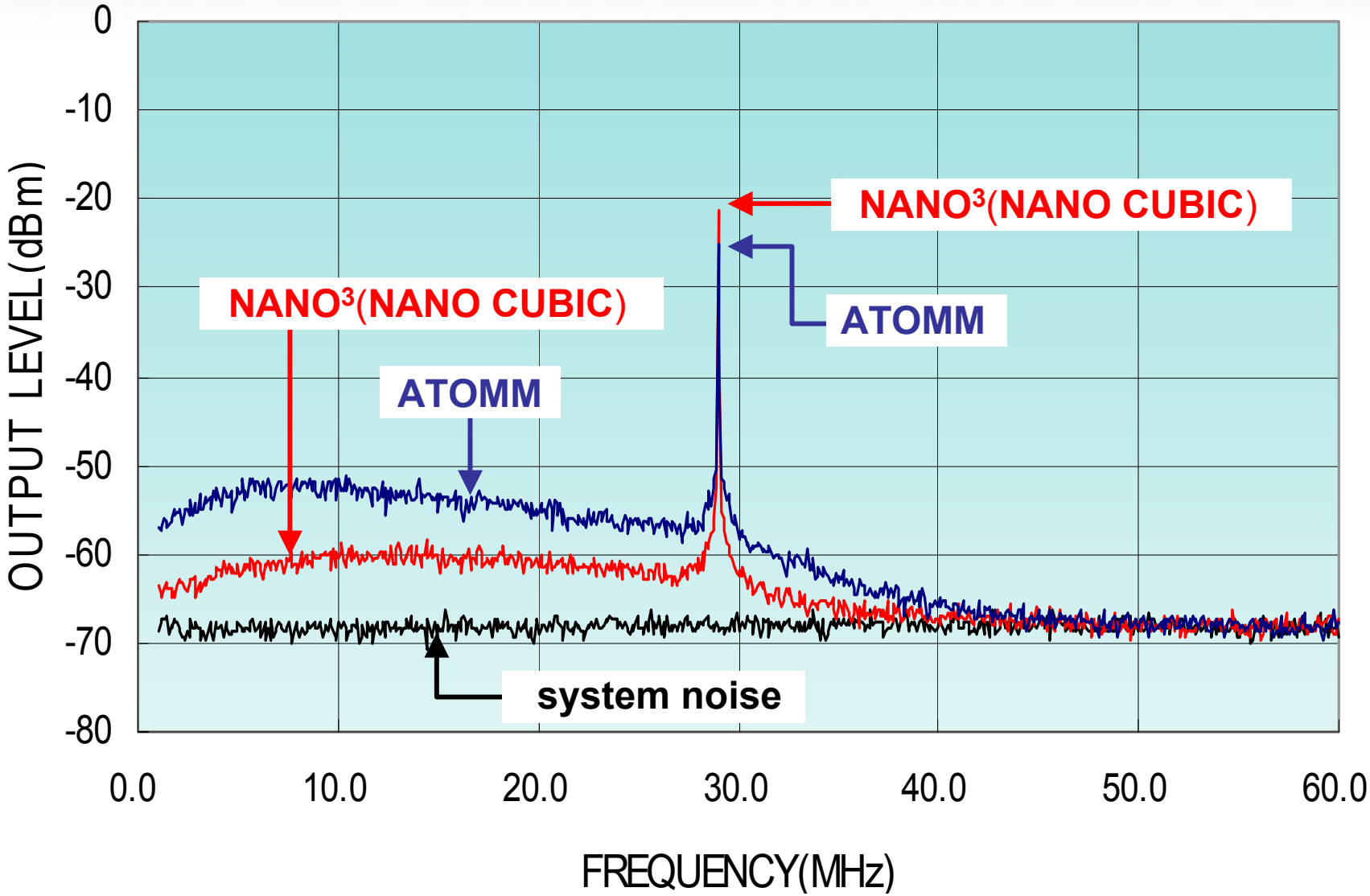


FUJIFILM
I&I–Imaging & Information

Fig. 8

Modulation Spectrum

Relative speed : 8.2m/s
Recording Signal : 180kfci



FUJIFILM
I&I–Imaging & Information

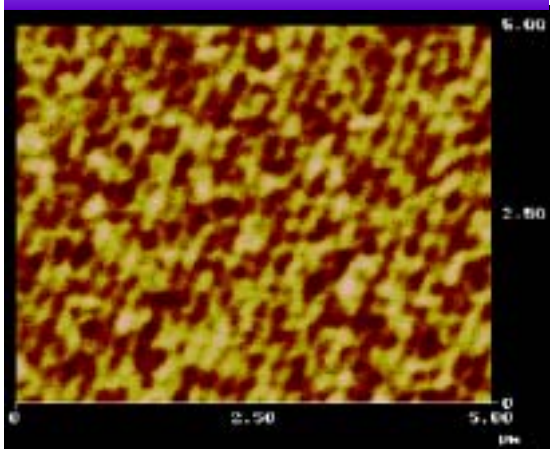
Fig. 9

MFM Image of Recorded Signals on Magnetic Layer

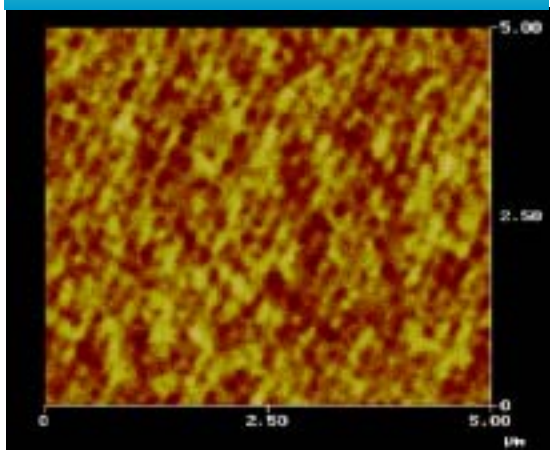
NANO³(NANO CUBIC)Technology

Thin Magnetic Layer
Fine Grain Magnetic Particle
→ Sharp Magnetization Transition
→ High Resolution

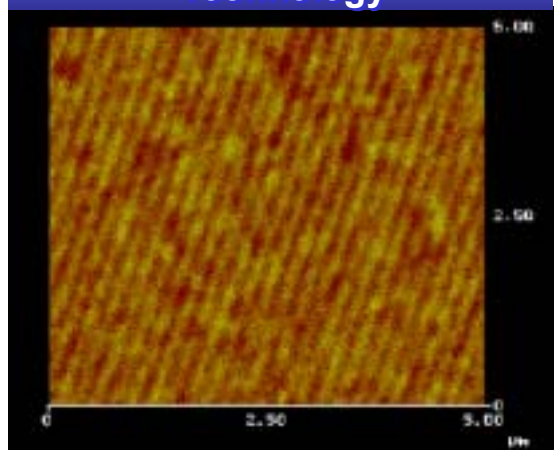
Fujifilm Mini DV(ME Tape)



ATOMM Technology



NANO³(NANO CUBIC) Technology



This photograph is an observation of the truck of the recorded tape magnified by MFM. (Magnetic Force Microscope)
MFM observes the intensity of the magnetic field which occurs from the recorded tape directly.
Sharper pattern image of MFM means high resolution media.

FUJIFILM
I&I–Imaging & Information

Fujifilm NANO^3(NANO CUBIC) Technology

- Fujifilm announced NANO CUBIC Technology on November 6, 2001 and has begun to work with drive manufacturers to develop new, high capacity magnetic storage products using NANO CUBIC technology.

Thank You!

Questions?