

*Our mission is to provide our customers with user-friendly, reliable
and productive ALD process tools*



PICOSUN – HOW DID WE MAKE IT

Paving the Way from R&D to Production

**Juhana Kostamo
Managing Director
Picosun Oy**



Member of
**CLEANTECH
FINLAND**



1976, Born

Juhana Kostamo

2000, Graduated

M.Sc, Helsinki University of Technology

2001 – 2005

ASM International, Project Manager

2005-2006

Chief Operating Officer, Picosun Oy

2006 –

Managing Director, Picosun Oy

Picosun – the company overview

Background

- Picosun Oy (Ltd) established in 2003
- Pioneering ALD experience since 1974
- Core business: Developing and manufacturing high quality R&D and production ALD tools for the world wide markets
- Profitable for 5 consecutive years
- Fast-growing: 100% growth in FY 2010 (5/2010–4/2011)
- Sales est. 10,5 M€ in FY 2011 (5/2011–4/2012)
- Has quickly become the largest ALD tool manufacturer in Northern Europe

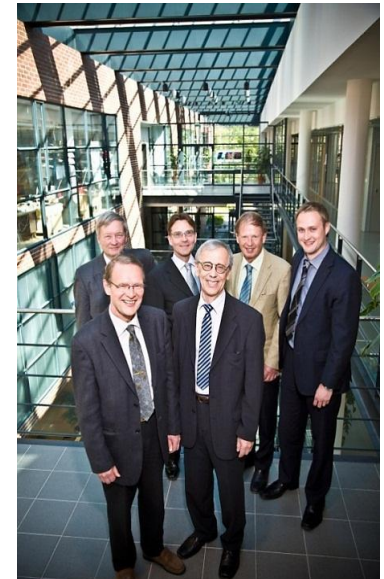


Mission

- To serve the global market with user-friendly, reliable and productive ALD systems for R&D and production

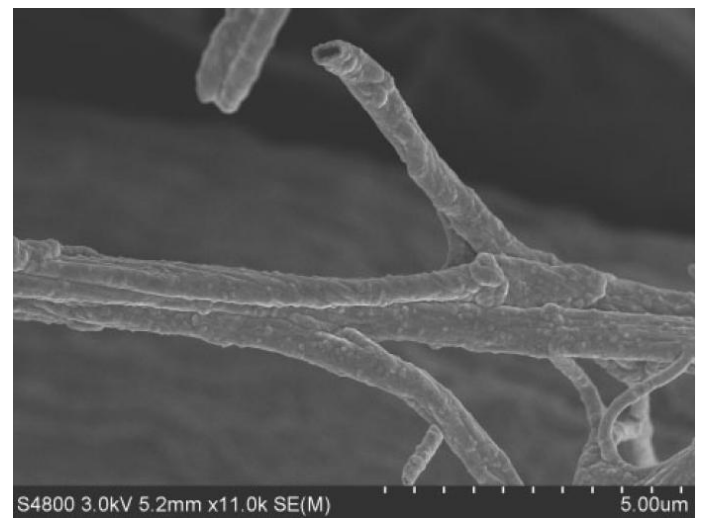
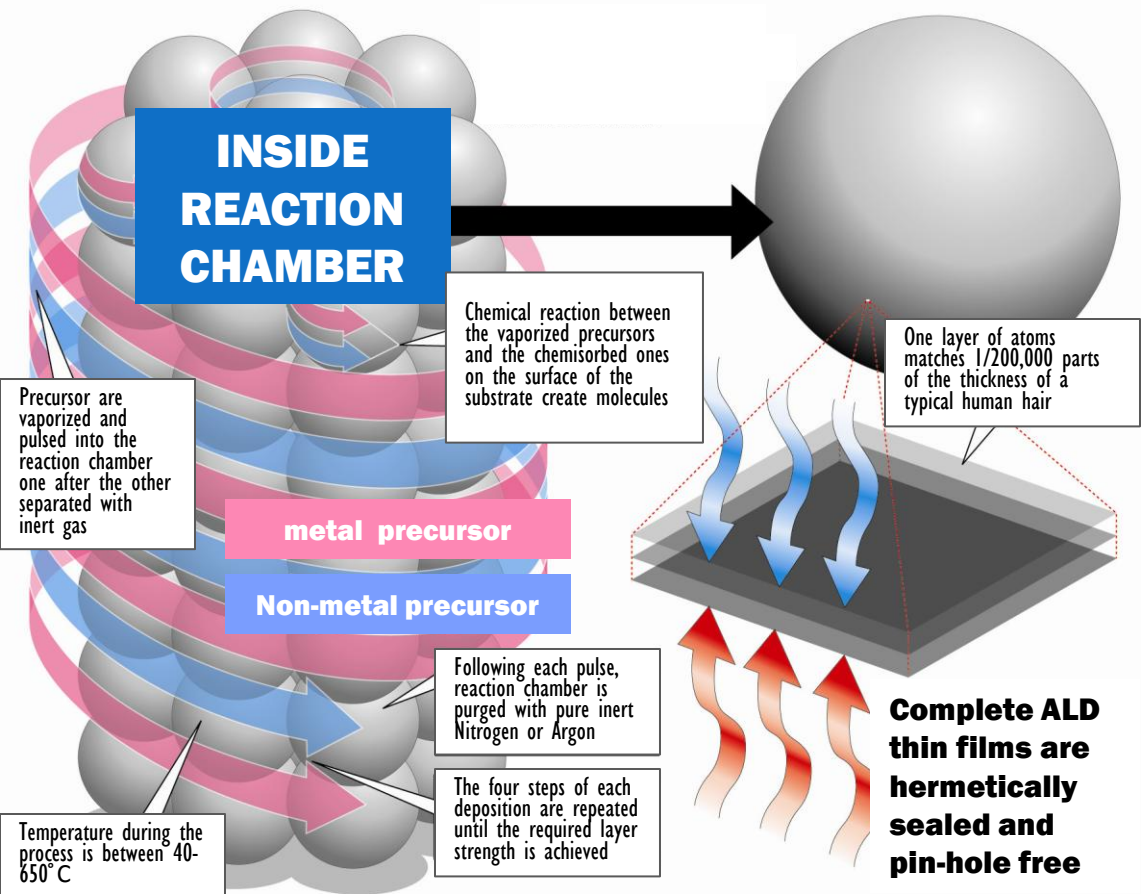
Team

- Altogether 30+ people and 40+ subcontracting companies take part in the operation.
- 10 PhD's (incl. Board Members)



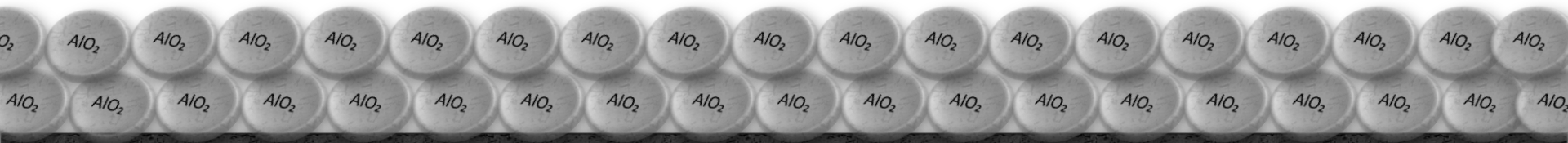
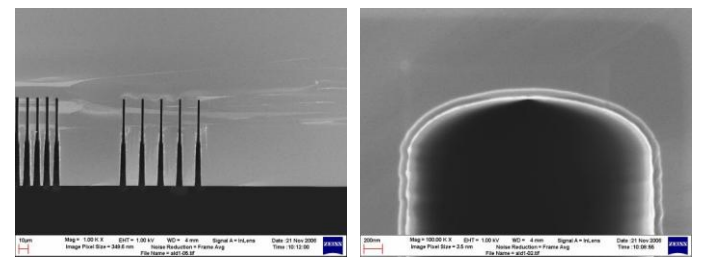
ATOMIC LAYER DEPOSITION

ALD REACTOR



Cellulose paper fibres ALD-coated with Titanium oxide (TiO₂)

ALD coating of nano-rods (left); Tip of a nano-rod magnified (right)



Substrate, like Silicon, glass or metal

PRACTICAL ADVANTAGES OF USING ALD

Precise film thickness control by the number of deposition cycles

No need to control reactant flux homogeneity

Excellent uniformity and conformality

Large area capacity and batch capability

Dense, uniform, homogeneous and pinhole-free films

Atomic level composition control

Good reproducibility and straightforward scale-up

Wide range of film materials available

Extremely accurate control of mixed oxides, graded layers and nanolaminates

High density and low impurity level of the films enable excellent physical and chemical properties

Lower deposition temperature can be used for sensitive substrates adding to the selection of available deposition materials

Introduction of ALD applications

Applications



Dr. Tuomo Suntola
Picosun Board of Directors

CMOS
DRAMs
Interconnects
Antitarnishing
Optical
Etch masks

Solar
LEDs
Batteries
Fuel Cells
OLEDs
Corrosion
protection
NEMS
TSVs

Capacitors
Magnetic Heads
MEMS

III-Vs, Catalysts

Electroluminescence

1974 1977

1984

1990

1999

2007

2010

PICOSUN BACKGROUND

Picosun Oy established in 2003
Pioneering ALD experience since 1974
A recognized need for an entry level ALD reactor and an existing gap for a straightforward transition from research through R&D to production discovered

PICOSUN MISSION

Highest quality research, R&D and production tools for world wide markets

PICOSUN PEOPLE

BOARD OF DIRECTORS: M.A. Econ. Kustaa POUTIAINEN, Chairman and CEO, also Chairman and CEO of Stephen Industries Inc Oy, majority shareholder of Picosun Oy;
Ph.D Tech. Tuomo SUNTOLA, former Managing Director of Microchemistry and Executive Advisor of Picosun;
Professor, Ph.D Tech. Lauri NIINISTÖ, globally one of the most prominent scientists introducing ALD as a subject for research in Academia since late 1970's;
Professor, Ph.D Jorma ROUTTI, one of the founders of Finnish venture capital, one of Europe's leading technology experts, former Director General of European Union's Science Directorate;
Picosun CTO Sven LINDFORS, Picosun founder, world's most experienced designer of ALD equipment and systems since 1975;
Vice-president Stephen Industries Inc Oy Timo MALINEN, production expert.
STAFF: Named the "DREAM TEAM OF ALD"; possessing over 200 years of combined first-hand ALD experience. Have been part of building 15 generations of ALD equipment. No match anywhere.

Eternal quest of the science community for new knowledge, new observations, new experience

SCIENCE COMMUNITY

ALD allows the study of materia in an unprecedented scale in a completely new way; allows even the artificial creation of what could be called new materia

Building bridges between the pages of science publications and factory floor production

COMMERCIAL R&D

ALD allows the testing of materia in an unprecedented scale in a completely new way opening up possibilities to create improved and/or new products and/or production methods

Quest for new and/or better and/or cheaper-to-manufacture products and business opportunities

MANUFACTURING INDUSTRIES

ALD allows the use of materia in an unprecedented scale in a completely new way creating improved and/or new products, production methods or the like

BASE FOR BUSINESS

**Science
Community**

SCIENCE COMMUNITY

ALD allows the study of materia in an unprecedented scale in a completely new way; allows even the artificial creation of what could be called new materia

Commercial R&D

COMMERCIAL R&D

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**Manufacturing
industries**

MANUFACTURING INDUSTRIES

ALD allows the use of materia in an unprecedented scale in a completely new way creating improved and/or new products, production methods or the like

CLIENTS

**High-value-for-money
basic ALD system for
research use**

INEXPENSIVE AND SUPERIOR

The global science community is very dependent on funding from commercial sources, often searching solutions for specific problems. By covering the science community you build a base to reach your actual, final target group

**Highly adaptable and
extremely versatile
ALD system which
accurately repeats
results of research in
R&D scale**

EXPENSIVE AND SUPERIOR

Commercial R&D follows closely the work of the global science community and acts as a natural bridge between universities and business enterprises commercializing some of the findings of science

**Mass produced
reliable and accurate
ALD manufacturing
systems for industrial
use**

SUPERIORITY & VALUE-FOR-MONEY

Mass production of expensive production equipment is where the real business of ALD systems manufacturing lies.

PRODUCTS

1. Equip as many universities as possible with SUNALE™ R-series ALD-systems

BUILD YOUR BASE

Much of what can be done with ALD in manufacturing industries is yet to be defined. Strong position in the science community gives you heads-up in terms of allowing you to identify tomorrow's business early in the cycle

2. Follow the lead from universities to commercial actors by using R&D as the bridge

BUILD A BRIDGE

By facilitating the scaling up of results from research to serious commercial R&D, you create a chain of links which lead from research through R&D straight to manufacturing allowing you to equip each step with your SUNALE™ ALD hardware

3. Create superior high volume ALD production systems and be creative in how ALD can be used by industries

MAKE SOME MONEY

Having a strong position in research and R&D makes you a natural partner for industries looking for new solutions in manufacturing their products. Every system sold is a vehicle to significantly improve your market position.

BUSINESS PLAN

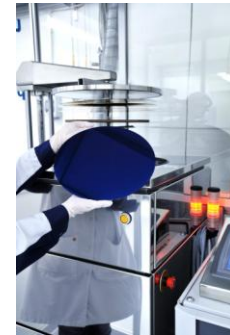
The price of a Picosun SUNALE™ ALD-system start at the level of a very expensive car. Depending on the requirements of the system, price tag can rise as high as an expensive house. In the future, individual sales will grow even larger in size when Picosun starts selling large multi-reactor production systems for industrial use.

**R
SERIES**



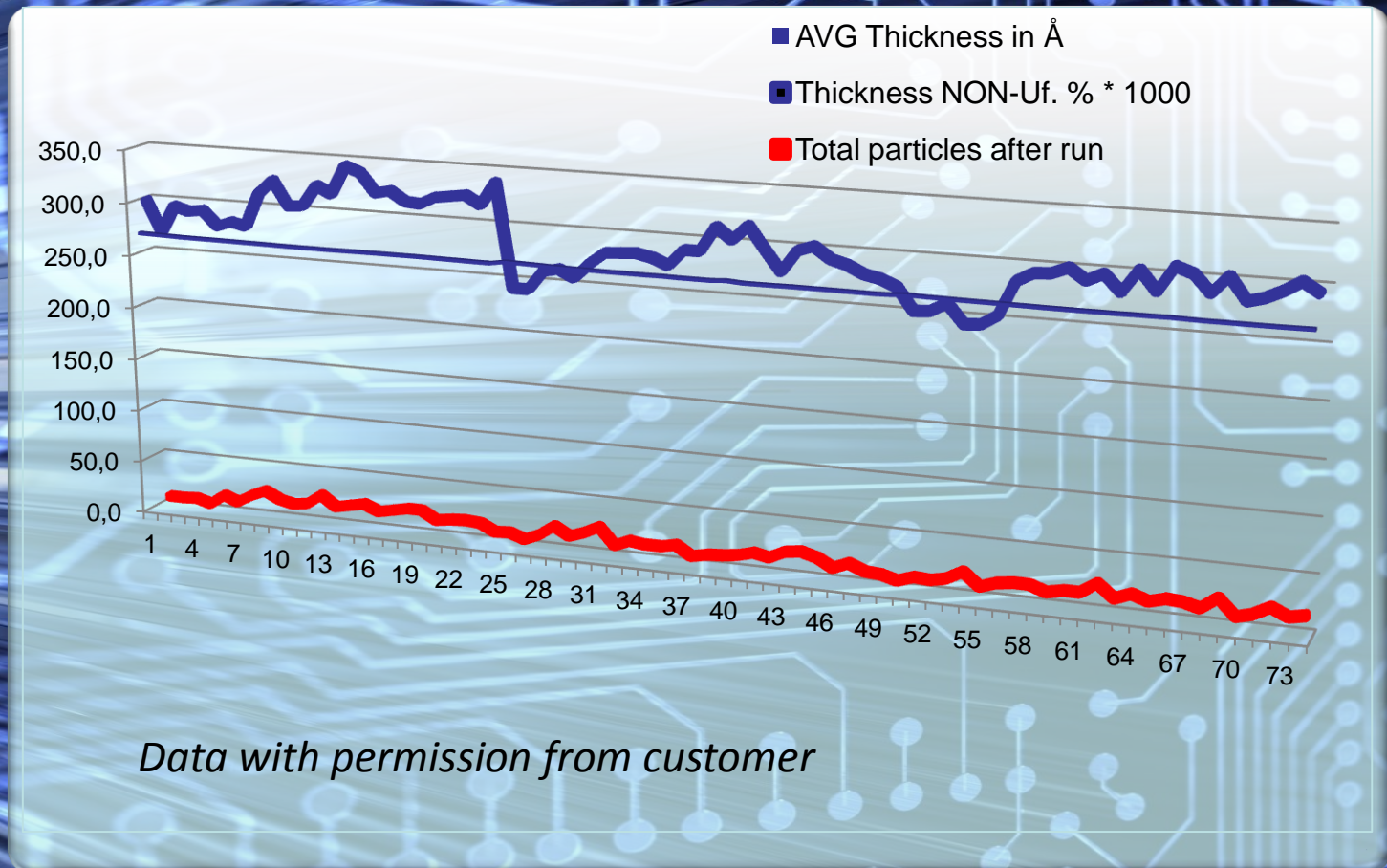
First Picosun SUNALE™ prototype was built in 2004, first customer (VTT Technical Research Centre of Finland) in 2004, first reactor was exported (USA) in 2006, first reactor for production use (Vaisala) was delivered in 2007. Picosun's own factory was opened in 2009.

**P
SERIES**



Batch process uniformity and particles

Al₂O₃ Process Ramp-Up Results



Data with permission from customer

Average Thickness, Non-Uf. and total particles/wfr
25 wafers (8") in the batch



PICOSUN'S GLOBAL MARKET

Picosun worldwide

HQ in Espoo, Finland

Factories in Masala,
Finland

North American
HQ in Detroit,
Michigan

Thank you for your attention!

Global Distribution Partner Network

Worldwide Support

For more information contact www.picosun.com