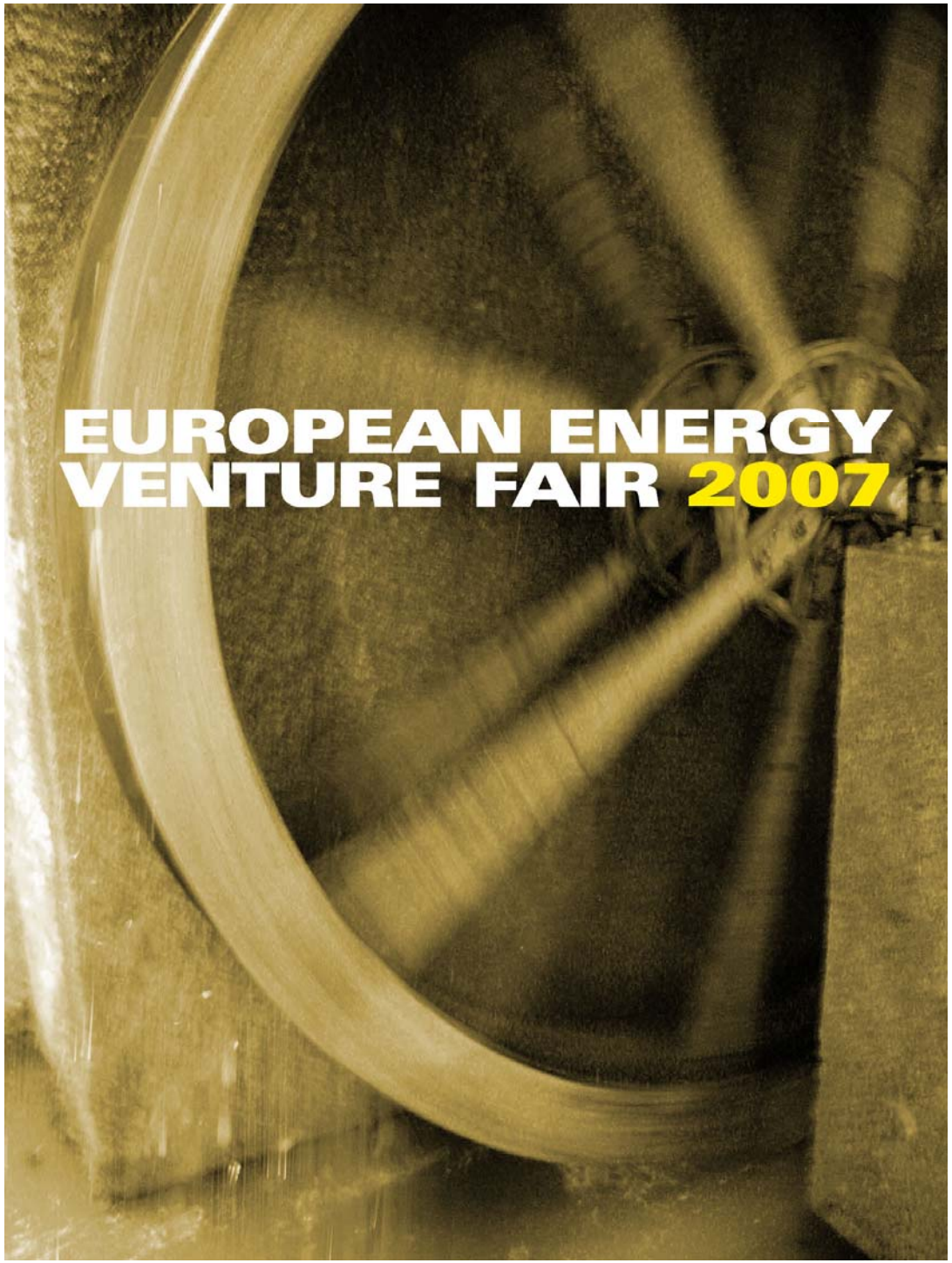
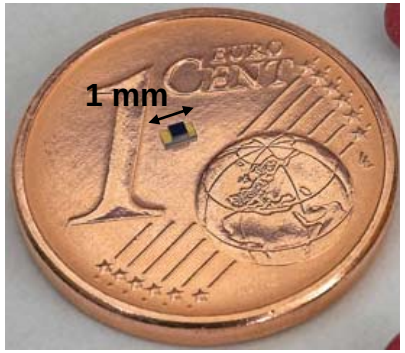


micropelt

European Energy Venture Fair
September 17-18th 2007
Zürich, Switzerland

Micropelt GmbH - General

- **About Micropelt**



MPC-Series 1mm²

TE-Power-Plus

Leader in chip-size Thermoelectrics

– Product company with **2 product lines**:
  - World's smallest Peltier cooler with sub-mm dimensions (MPC-Series)
  - First commercially available energy harvesting modules (TE-Power-Plus) recovering waste heat
– Volume scalable production technology for miniaturized thermoelectrics
– Pilot production line in Freiburg with 100.000 units capacity p.a.
– World-leader team in thin-film thermoelectrics with 50+ years experience

Micropelt GmbH – Introduction

- **Technology fundamentals**

Power generation

– Electrical energy:

Temperature gradient (delta T) between “hot”- side and “cold”- side

=> Several mWatt from delta T of 20°C

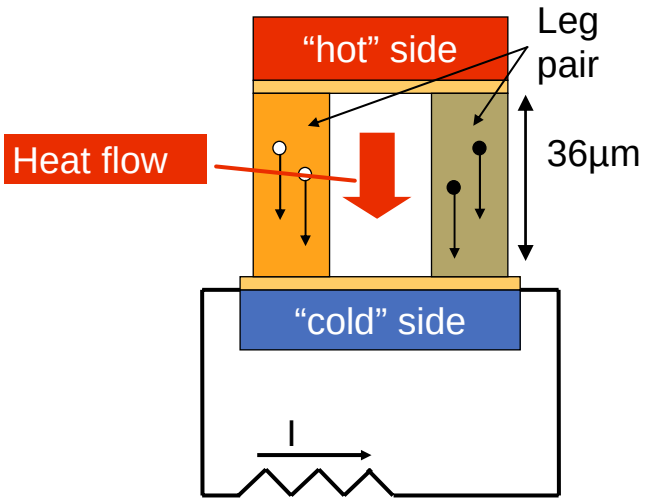
Chip size 10mm²

Sufficient to power e.g. wireless sensors

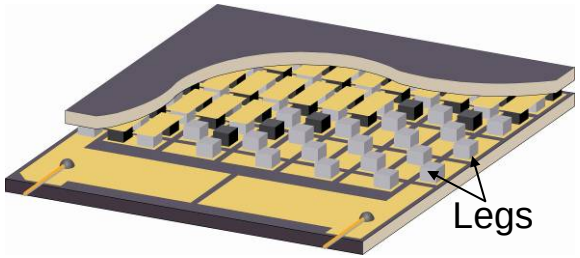
Refrigeration/Heating

– By applying electrical current, the “cold”-side significantly cools below ambient temperature

=> World-record 60°C cooling over 36µm leg height



Principal thermoelectric element



Typical thermoelectric element

Micropelt GmbH - Market

- **Addressing 4 Micropelt-unique target applications:**

1 Life Science - PCR Cycling:

- Throughput and process time for DNA amplification system is determined by cycling speed (heating & cooling)
- micropelt offers 3 times faster cycling compared to existing systems; process time reduction by 50%

PCR Cycler well block

2 Power generation – Wireless sensors:

- Example: Bearing elements
- 10% budget spend in production lines for maintenance
- micropelt offers chip-size power sources for condition monitoring systems to extend maintenance intervals, prevent from unexpected break-downs

Sensor bearing with cable

Micropelt GmbH – Market (cont.)

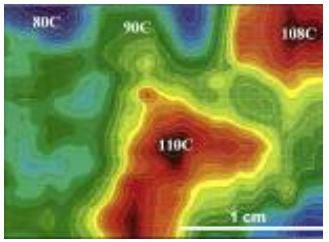
3 Laser cooling – Telecom and Power laser:

- Many Laser modules in telecom and power use expensive package types; Industry trend towards smaller sizes;
- micropelt offers micro-cooler products specifically designed for low cost package types
- Integrated features: Temperature sensors further reduce assembly and product cost

4,5mm ∅ package with MPC-D303 cooler

4 Chip spot cooling:

- Integrated circuits are limited in performance and life time through thermal gradients and hot spots.
- micropelt develops embedded and cheap spot cooling solutions; increased reliability; 10% performance increase with 6mm^2 cooler



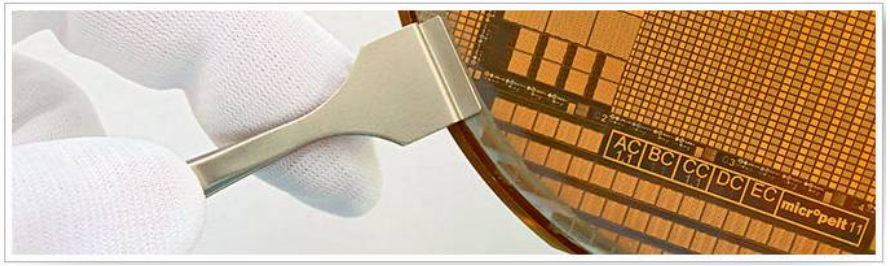
IC thermal profile with hot spot

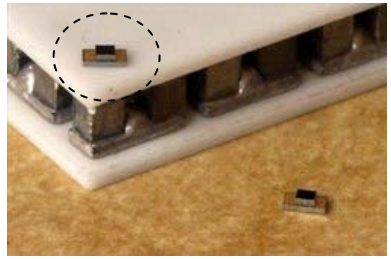
Micropelt GmbH – Business

- **Business Details**
  - Cumulated addressable market in target segments > 500Mio € p.a.
  - Systems development to realize performance goals in Power generation & PCR
    - Strong IP and know-how generated
    - Clear IP strategy in all segments
  - Current business planning includes 30 wafer starts per week production site

Micropelt GmbH – Technology and Product

- **Technology and Product**





1mm² Micropelt chip on top of conventional element

- Micro Electro Mechanical (MEMS) wafer technology using conventional 6-inch semiconductor production equipment
- Platform technology with 2 product lines: Peltier cooler and power generation devices
- Technical staff primarily focused on core technology and IP development
- Application engineering team generating know-how and IP with focus on electronics and packaging

Micropelt GmbH – Team & Management

- **Team and Management**

  – 15 fully time employees, 10 part time and students

  – Management and key technical with 25% shares and strong financial commitment

    - CEO **Fritz Volkert** with 10 years experience in international semiconductor business (ex Infineon); entrepreneur since 1995;
    - CFO **Bengt Meder** with 22 years in international finance & controlling
    - CTO **Dr. Joachim Nurnus** leading scientist in thermoelectric community (multiple patents and papers, ex Fraunhofer)
    - COO **Axel Schubert** with 25 years experience in semiconductor processes and technology transfer (ex Infineon)
    - VP Business Development **Burkhard Habbe** has 20 years experience in international microelectronics business