

# THE EU CHIPS ACT R&D INTEREST FROM SLOVENIA

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# R&D INSTITUTIONS INTERESTED IN CHIP TECHNOLOGY

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# VIEWPOINT: EU CHIPS ACT NEEDS TO ADDRESS THE ROLES/CONTRIBUTIONS FROM SMALL COUNTRIES TO THE COMMON GOALS IN PROMOTING:

- LOCAL R&D INVESTMENT IN FACILITIES AND KNOW-HOW FOR ACHIEVING WORLD TECHNOLOGICAL COMPETITIVENESS AND CRITICAL MASS
- FOCUS ON NICHE TECHNOLOGIES (BOTTOM-UP)
- SUSTAINABLE PRACTICES (EVALUATION OF RESULTS, CONTINUATION OF SUCCESSFUL PROJECTS)

It is important to avoid the fragmentation that diluted the effect of Smart specialisation strategy (S3)!

# RELEVANT BACKGROUND: US CHIPS ACT 2022 SUMMARY AND CRITIQUE (BY US SOURCES)

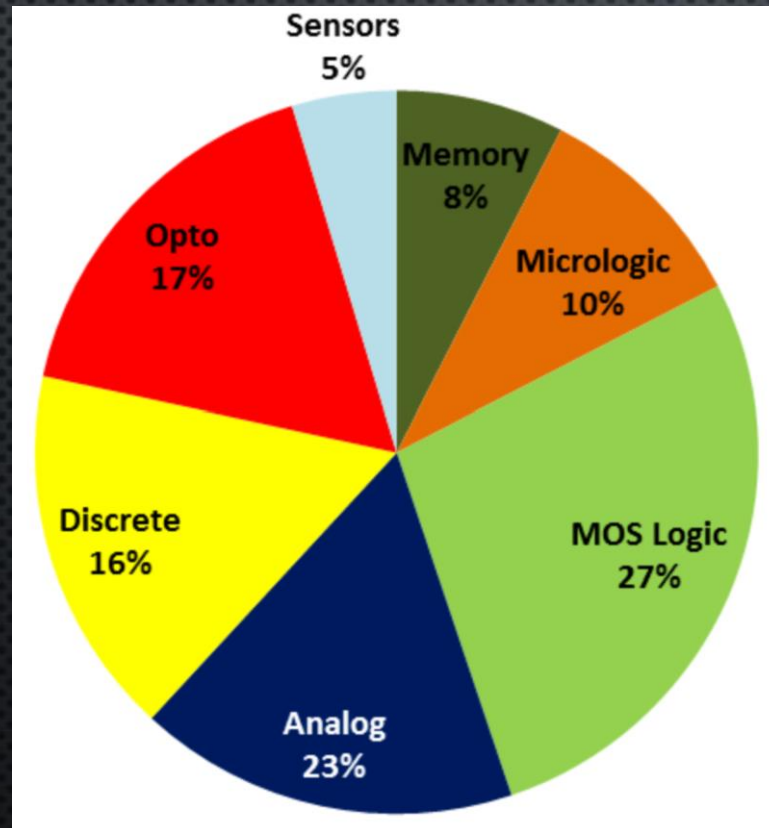
## THE FIGURES:

- \$39 BILLION FOR BUILDING OR MODERNIZING DOMESTIC SEMICONDUCTOR MANUFACTURING CAPABILITIES.
- \$11 BILLION FOR RESEARCH AND DEVELOPMENT AND WORKFORCE PROGRAMS.
- \$2 BILLION FOR UNIVERSITY-BASED SEMICONDUCTOR RESEARCH FOR DEFENSE APPLICATIONS.

## CRITICISM (US SOURCES)

- TOO LITTLE FOR R&D, WHICH IS WHERE THE US TRADITIONALLY LEADS.
- THE FUTURE IS IN NICHE PRODUCTS (IN THE US!)
- INVESTMENTS INTO NEW LARGE FABRICATION FACILITIES IS NOT A SENSIBLE INVESTMENT, CONSIDERING THE 2-YEAR LIFETIME OF A TECHNOLOGY, AND COST OF A NEW FACILITY (CAN BE >40 BN\$)

# DIVERSITY OF CHIP USES (DATA FOR 200MM WAFERS IN THE US)



NICHE PRODUCTS ARE THE NORM.

# MATCHING SLOVENIAN INTERESTS WITH EU PRIORITIES

## European Chips Act

The Chips Act proposes:

- **Investments in next-generation technologies**
- Access across Europe to **design tools and pilot lines for the prototyping, testing and experimentation of cutting-edge chips**
- **Certification procedures for energy-efficient and trusted chips** to guarantee quality and security for critical applications
- A more **investor-friendly framework** for establishing manufacturing facilities in Europe
- **Support for innovative start-ups, scale-ups and SMEs** in accessing equity finance
- **Fostering skills, talent and innovation in microelectronics**
- Tools for **anticipating and responding to semiconductors shortages and crises** to ensure security of supply
- Building **semiconductor international partnerships** with like-minded countries

### Short term

Anticipate, coordinate and prepare for future chips crisis to ensure rapid response to disruptions in supply chains.

### Medium term

Strengthen design and manufacturing capacities in Europe.

### Long term

Maintain Europe's technological leadership through transfer of knowledge from R&D to production.

## Interests in Slovenia

### 1. Top down:

- Nanofabrication for prototyping, testing and experimentation of **diverse** next- and next-next- generation chips (niches: quantum, AI, planet-friendly etc.)

### 2. Bottom up:

- Supporting platform (e.g. thin film materials for specialised nextgen chips)
- Energy efficient chips (memory, solar cells)

### 3. Design tools and education/training

# Nanocenter is a provider of open access research infrastructure.

Our Equipment



## World-class

We have some of the best equipment in Europe, with a dedicated support team to maintain quality and advise on capabilities.



## Open access

We welcome industry professionals and Young researchers, with the aim of building long-term relationships and knowledge-exchange.



## Working together

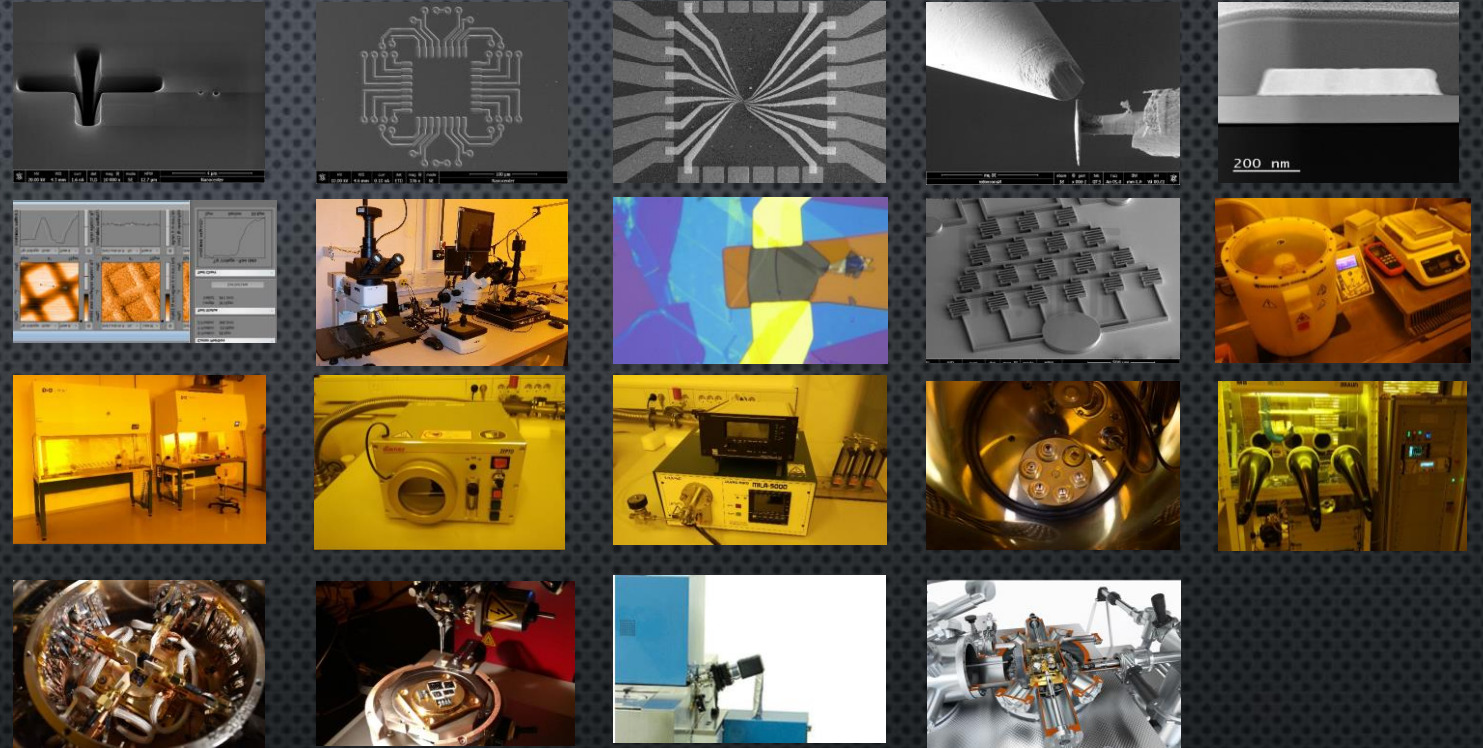
Mixed academic-industry teams lead to breakthroughs, new product development and competitive advantage.

# ADVANCED QUANTUM DEVICES LABORATORY \*



## Advanced Quantum Devices Lab

Advanced Quantum Devices Laboratory - AQDL is a new nanofabrication, test and measurement facility dedicated to serving a wide community of academia ...



Users/project partners:



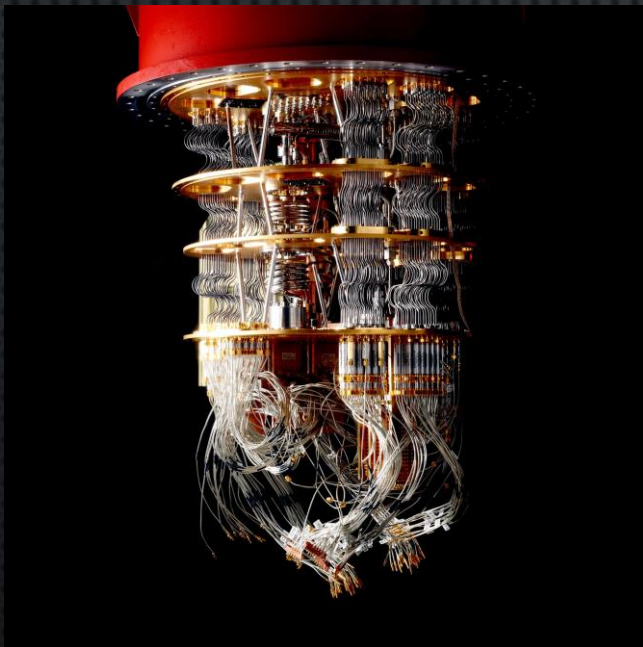
\* Joint venture Nanocenter-IJS





# EXAMPLE OF A NICHE TECHNOLOGY IN SLOVENIA:

High efficiency memory devices for next generation cryocomputing (incl. quantum)



EMERGING TRECHNOLOGY

## Charge Configuration Memory (CCM)

AN 2-TERMINAL ULTRAFAST ELECTRONIC NON-VOLATILE MEMORY CONCEPT FOR LOW-TEMPERATURE, ULTRA HIGH SPEED, LOW-ENERGY APPLICATIONS.

**NANO LETTERS**

pubs.acs.org/NanoLett

Letter

### Charge Configuration Memory Devices: Energy Efficiency and Switching Speed

Anze Mraz,\* Rok Venturini, Damjan Svetin, Vitomir Sever, Jan Aleksander Mihailovic, Igor Vaskivskyi, Bojan Ambrozic, Goran Dražić, Maria D'Antuono, Daniela Stormaiuolo, Francesco Tafuri, Dimitrios Kazazis, Jan Ravnik, Yasin Ekinci, and Dragan Mihailovic

Cite This: <https://doi.org/10.1021/acs.nanolett.2c01116> | Read Online

Applied Physics Letters | ARTICLE | scitation.org/journal/apl

### Ultrafast non-thermal and thermal switching in charge configuration memory devices based on 1T-TaS<sub>2</sub>

Cite as: Appl. Phys. Lett. 119, 013106 (2021); doi: 10.1063/5.0052311  
Submitted: 30 March 2021 · Accepted: 31 May 2021 · Published Online: 8 July 2021

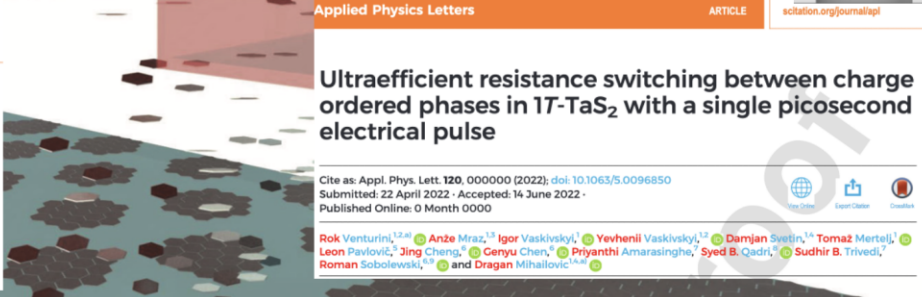
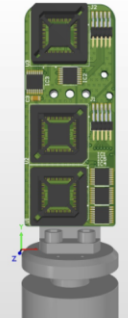
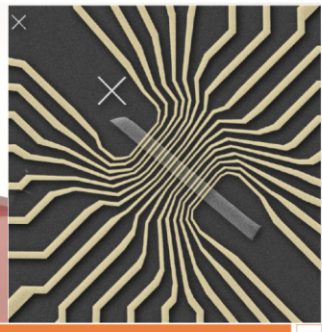
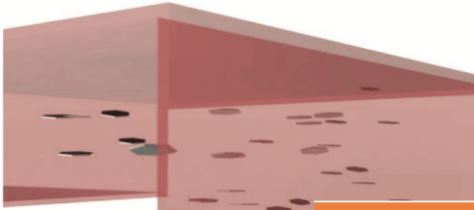
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**Applied Physics Letters** | ARTICLE | scitation.org/journal/apl

### Ultraefficient resistance switching between charge ordered phases in 1T-TaS<sub>2</sub> with a single picosecond electrical pulse

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