Advanced Materials and Quantum Technologies: Enabling Electronics, Green Energy, and Next-Generation Innovations

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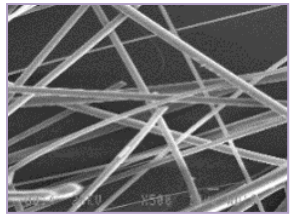
Green technologies

Insulation materials

Foamed glass.



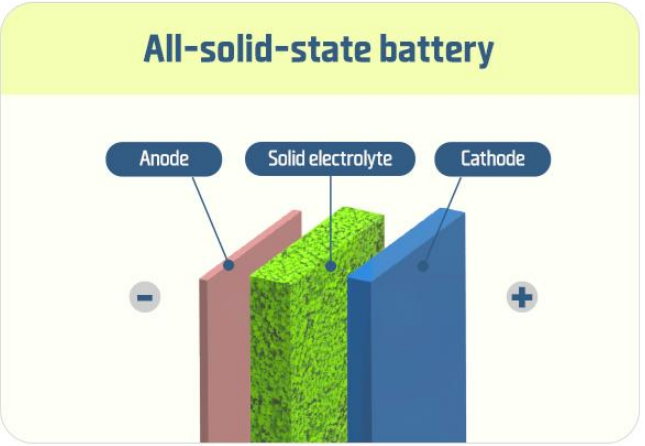
Stone wool fibers

- Recycling and use of secondary raw materials
- Novel composites
- Glass foaming mechanism
- Crystallization processes
- TRL: 1-9

Green hydrogen

- Green Deal activities
- (Photo)electrochemical water splitting – direct/indirect
- Nobel metal-free cocatalysts
- Use of recycled solar panels
- Production of NH_3

Batteries



- Sodium and lithium-ion batteries
- Solid-state electrolyte batteries
- Safety aspect
- Thin-film battery research - integration with IC

Nanotechnologies

Magnetic materials

Rotor

Wind generator

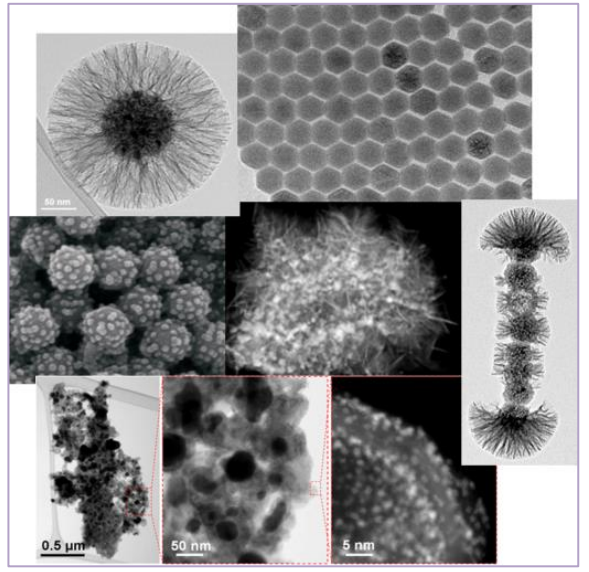
- Recycling of rare earth elements
- Reprocessing permanent magnets with reduced content of rare earth elements
- 3D printing of magnetic materials and complex alloys
- The European Critical Raw Materials Act

Materials for electronics

Ceramic pressure sensor

- Discrete and integrated components
- Varistors, capacitors, PTCR
- Materials for 5G
- Components without Pb
- Heterogeneous Integration
- Control of synthesis (atomic and microstructural level)
- The European Chips Act

Functional coatings



- Controlled synthesis of nanoparticles
- Regulation of surface properties
- Preparation of stable suspensions
- Dispersing into polymer matrices
- Formation of nanocomposites

Quantum technologies

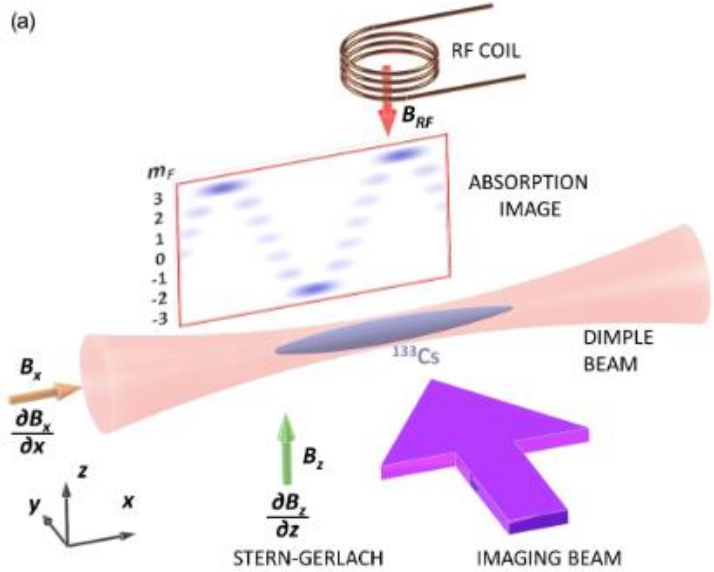
Quantum communications

- Setting up a demonstration national network
- Quantum random number generators for cryptographic use
- Quantum internet - quantum entangled photons for next generation quantum networks

Quantum computing

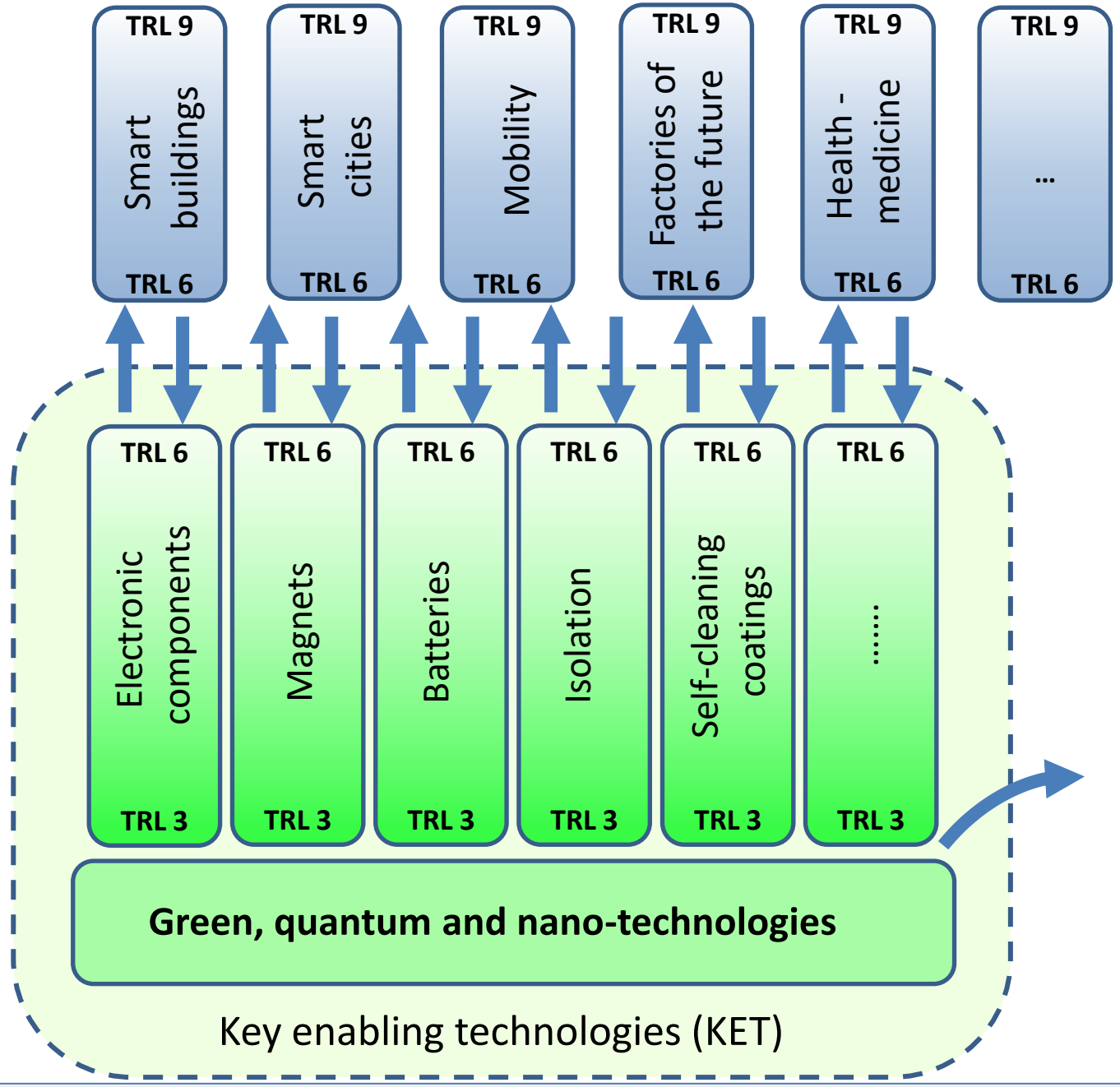
- Systems of ultracold atoms
- Superconducting devices
- Development of algorithms and tools
- Testing quantum computers
- Quantum memories

Quantum sensorics



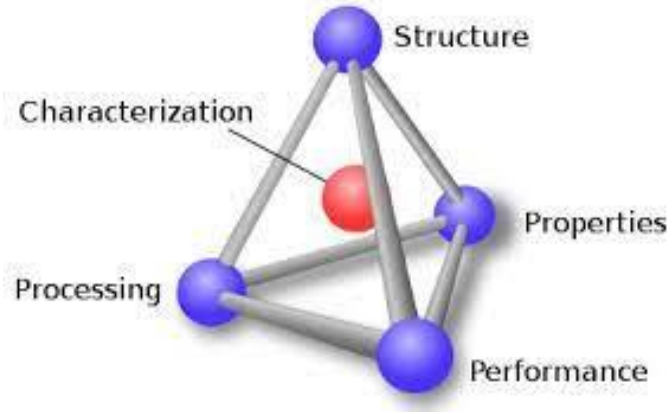
- Optical magnetometry

- The European Quantum Act

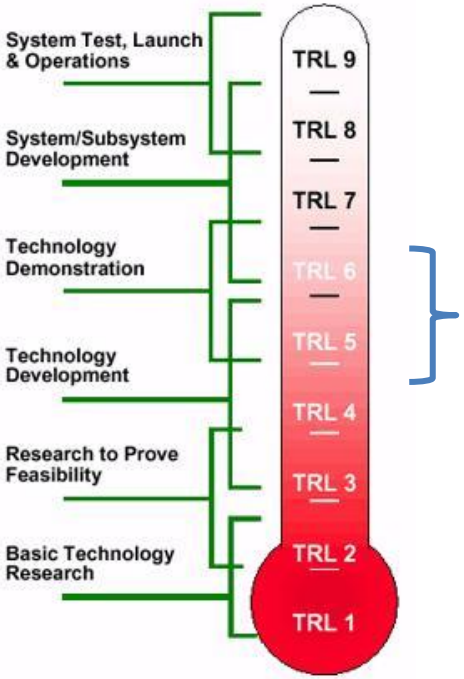


SRIPTOP

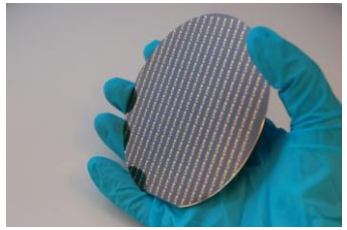
Integration with diverse value chains



OBJECTIVE 1: Development and demonstration of KETs



Pilot line



Pilot plant

OBJECTIVE 2: Clean room with associated technologies

- The first joint R&D center of industry and research organizations in Slovenia

IJS PLUS

Light, optics, photonics

Matter, materials, electronics

Quanta, principles driving research breakthroughs

Physics

Chemistry and biology

Materials

Information and communication technologies, artificial intelligence

- **Internationalization:** international conferences, partnerships, associations
- **Education:** conducting workshops, staff training
- **Exchange of good practices:** involvement in international projects