

Opportunities for nanotechnologies, advanced materials and technologies 2030 and beyond



CLIMATE ACTION

LOW CARBON MOBILITY AND COMMUNICATION

- Smart mobility services
- Low emission power trains
- Zero energy communications

ENERGY INTELLIGENCE

- Energy users as producers
- Value from energy system flexibility
- Energy storages everywhere

LOW CARBON ENERGY

- Future renewable energy solutions
- Future nuclear energy

CLIMATE NEUTRAL INDUSTRIAL PROCESSES

- Zero-C industry



RESOURCE SUFFICIENCY

RENEWABLE MATERIALS

- High performance materials
- Zero environmental impact processes
- Agile material-product integration

SUSTAINABLE NON-RENEWABLES

- Mineral materials from secondary resources
- Material substitution

CARBON REUSE ECONOMY

- CO₂-derived energy carriers
- Carbon cycle in forest industry
- High-value products from CO₂ compounds

FOOD 4.0

- Re-think agro-food processing
- Food without fields



GOOD LIFE

DISRUPTION OF WORK

- Productivity, competitiveness and wealth by Artificial Intelligence
- Sharing and platform economy
- Agile and learning society

CITIZEN CENTRIC CARE

- Preventive health support
- Predictive diagnostics and care
- Healthcare process optimization

SMART BUILT ENVIRONMENT

- Urban intelligence
- Cognitive built environment
- Future proof cities



SAFETY AND SECURITY

SECURING CRITICAL SUPPLIES

- Water resilience
- Resource flows in super connected ecosystems

CYBER SECURITY

- Seamless security
- Secure communication networks
- Critical infrastructure protection

SECURED AUTONOMOUS SYSTEMS

- Autonomous transport hubs
- Safe autonomous operations
- Controlled autonomy



INDUSTRIAL RENEWAL

DESIGN FOR FUTURE

- Customer as a designer
- Artificial Intelligence as a designer
- Design for life-cycle excellence

RE-BIRTH OF PRODUCTION

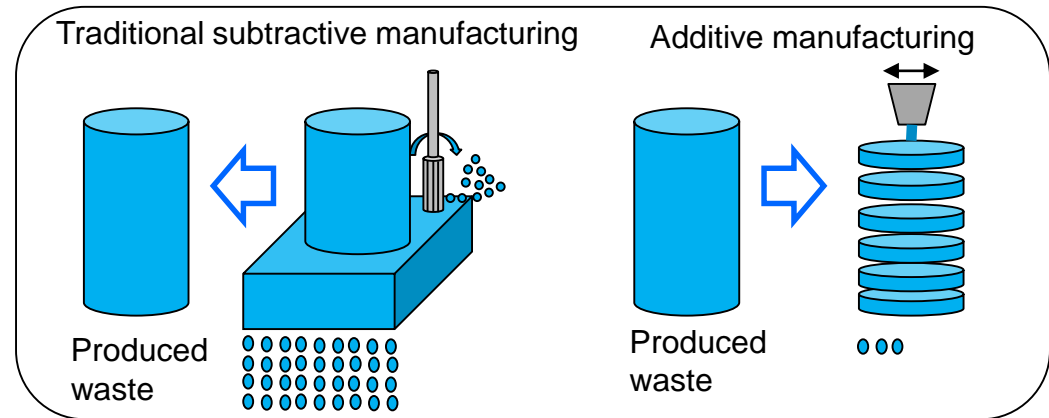
- Manufacturing for need
- Real-time supply-chain
- Future production strategies

DISRUPTIVE BUSINESSES

- Operational excellence as a service
- Data as business

3D PRINTING OF BIOMATERIALS

- On-demand production
- Rapid prototyping / concepting
- Personalized products
- Mass customization
- Complex geometries
- Light-weight structures
- Efficient material usage



Wood materials

- Native lignocellulose materials
- Cellulose derivatives
- Thermoplastic lignocellulose materials

Biomaterials

- Polylactid acid (PLA)
- Starch
- Foodstuff

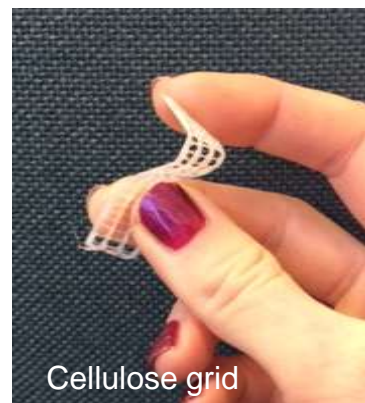
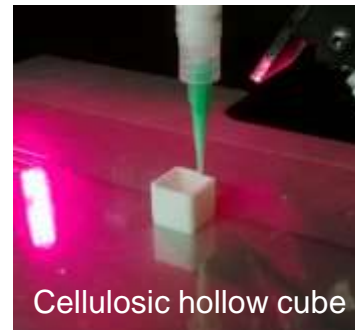


Photo by Kirsi Kataja

Shoe demonstration. Upper material is strong, cellulose based nonwoven textile, made by material researchers from VTT. The brown texture is made by 3D printing cellulosic paste. Demonstration is designed and made by Saara Kinnunen, HAMK. Contact person Jukka.Ketoja@vtt.fi.