

Research and Development

## Innovation News

**Germany's economy owes its global reach to innovation. Research and development is providing solutions to challenges in a range of sectors – from space exploration to agriculture.**

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### Jenoptik lens technology used in Mars Rover landing

The safe landing of NASA's Perseverance Rover on Mars in February was confirmed by images showing the vessel's successful entry, descent and landing. The lens technology used was developed by German photonics giant Jenoptik. The company developed, assembled and tested three different types of lens assemblies for the Mars mission at its facility in Jupiter, Florida. "We're proud that Jenoptik is helping pave the way for possible human exploration of Mars by engineering and manufacturing mission-critical technologies for space exploration" said Jay Kumler, responsible for optics business in North America. The engineering cameras and lens assemblies contributed by the Jena-based optics company will allow the Mars Rover to navigate, avoid hazards while moving and enable the collection of samples.

### German semiconductors in NASA Mars Mission

Computer chips that make the Mars Perseverance Rover intelligent also come from Germany. Semiconductor manufacturer Infineon produced special chips that perform special functions in the rover, the transport probe, the SkyCrane lander, and an orbiter circling the red planet. The chips control flight computers, radar, electric motors, and other important instruments. The chips have been specially developed to withstand high radiation levels, extremes of cold and heat, and sandstorms that can quickly ruin the sensitive technology.

### Max Planck researchers develop light-powered microswimmers

Researchers at the Max Planck Institute for Dynamics and Self-Organization in Stuttgart have developed a three-millimeter biocompatible microswimmer (soft microrobot) that uses light to propel itself forward. Much like a tiny solar cell with an integrated battery, particles of light energy are stored – thirty seconds of light being enough to power the microswimmer for around 30 minutes. A number of applications are foreseen for the microswimmer, with medical applications and environmental restoration in particular envisioned for the future.

### Innovative monitoring technology makes marine plastic visible

Researchers in the "MtecPla" project funded by the German government are developing the world's first monitoring technology to automatically identify and visual plastic waste on the sea floor. The project partners deploy a combination of hyperspectral imaging and AI-based algorithms for precise results. The algorithms deployed can be trained to recognize and classify plastic waste and extract the data needed for visual representation. It is hoped that the new

system will prove useful in the fight against plastic in the world's seas and oceans, allowing policymakers and NGOs alike to develop strategies and guidelines and raise public awareness.

### **World's largest autonomous R&D submarine built in northern Germany**

Germany's maritime industry is breaking new ground with the development of the world's largest autonomous research submarine. The MUM project ("Large Modifiable Underwater Mothership") will see the creation of a battery-powered submarine up to 50 meters in size that is capable of unmanned journeys of between 500 and 1,500 nautical miles. The modular system allows for the addition of a range of systems – including batteries, sensors, transport containers and even small underwater robots – for maritime research purposes as well as maintenance of offshore infrastructure including oilrigs, deep-sea cables and wind turbines. Members of the consortium delivering the project include Bremen-based company Atlas Elektronik, the Technical University Berlin, Rostock University, Berlin-based EvoLogics, and Kiel-based thyssenkrupp Marine Systems. The project is managed by the Jülich Research Center and funded by the Federal Ministry for Economic Affairs and Energy.

### **Osnabrück start-up develops organic seed treatment**

Agriculture start-up Seedforward has developed an organic seed treatment to support climate-friendly and sustainable farming. Increased regulatory restrictions on fertilizers, pesticides and seed treatments has led to many farmers reducing prevention and treatment methods in order to achieve stable yields. The Osnabrück company's solution is based on a unique combination of natural materials that has a positive effect on the resistance and efficiency of plants as well as the soil ecosystem.

### **Drones and satellites detect sick fruit trees**

Researchers at the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg are using satellite images and hyperspectral analysis to detect disease symptoms early in fruit-bearing trees. By detecting chlorophyll degradation early, apple and pear harvests can be protected from disease proliferation. Large orchards can be scanned with satellite imaging, with hyperspectral imaging – using hyperspectral cameras mounted on drones – complementing to establish an aerial early detection system for the protection of apple and pear crops. The research scientists hope to make the remote-sensing method using spectral data acquisition and analysis available to crop protection services, growers and cooperatives as a service when the project concludes in 2022.

### **This content is relevant for:**

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