POLYWISE

Polymer dielectric waveguides for high-frequency sensing and signal transmission

Initial Situation

The increasing demands on data rates, measurement resolution, and system integration are pushing sensor and communication systems into the frequency range of several hundred gigahertz. At these frequencies, metallic transmission lines and waveguides encounter physical, economic, and ecological limitations: high losses, rising costs, and limited sustainability restrict their long-term viability.

Innovative Solution

POLYWISE is developing **dielectric waveguides made of polymers** as a high-performance, cost-efficient, and sustainable alternative to metal-based transmission solutions. Through new polymer compositions and tailored manufacturing strategies, metal-free waveguides are being created with excellent high-frequency performance, low weight, and outstanding recyclability.

Technological Core

- Novel polymer materials with **precisely adjustable permittivity**
- **High thermal stability** from -40 °C to +105 °C
- Low-loss, low-dispersion signal transmission in the **sub-THz range**
- Compatible with established industrial processing methods

Added Value & Unique Selling Points

- **Higher performance** at very high frequencies
- **Cost reduction** by eliminating metals and alloys
- **Sustainability** through avoidance of scarce raw materials such as copper
- **New design and integration freedoms** for compact systems

Application Areas

- High-resolution sensing and measurement technology
- Automotive data transmission and driver assistance systems
- Industry 4.0 applications and smart production systems
- Future communication and radar systems

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Innovation Potential

POLYWISE is establishing a key technology that fundamentally transforms existing transmission and system concepts in electrical and communication engineering. The combination of high-frequency performance, industrial scalability, and sustainability opens up new markets and applications.

Interdisciplinary Approach & Vision

POLYWISE combines high-frequency, communication, polymer, and sensor technologies into a comprehensive innovation platform.
Vision: Rethinking high-frequency transmission technologies – powerful, sustainable, and ready for the systems of tomorrow.

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