



**maxell**  
Within, the Future

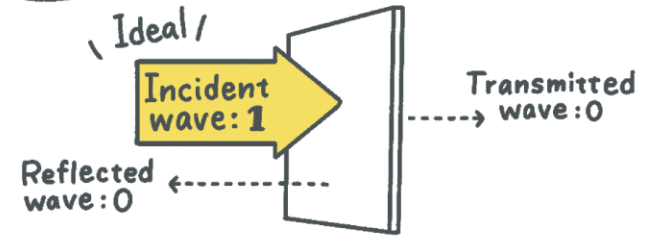
Tokyo Tech

# Millimeter-Wave/Terahertz Uni-/Bi-Directional Filter Development

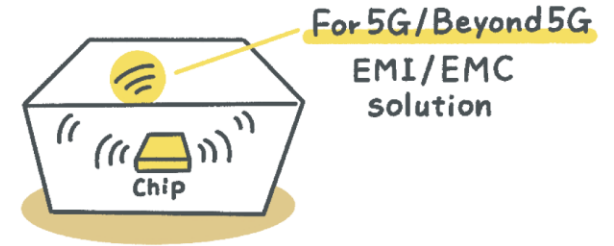
## Background

- 5G / Beyond 5G**  
"Ultra-high-speed wireless communication"
- Uni-directional filter**
  - Absorber**: Reducing Undesired EM-wave radiation
  - Reflector**: Extending the spatial coverage of desired EM-wave signals
- Bi-directional filter**
  - Transmittance improvement (Desired frequencies)
  - Reduction of undesired signal radiation
  - Device / module protection

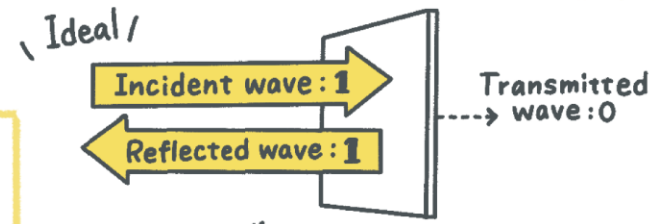
## Research Summary



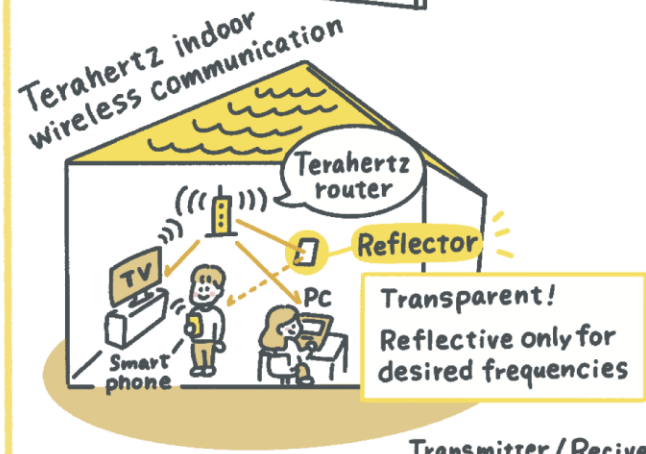
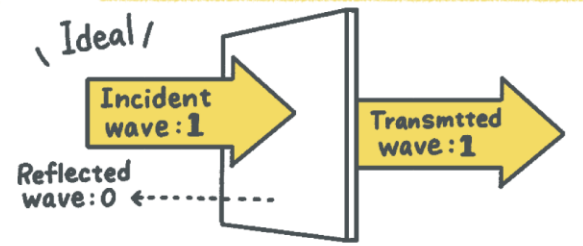
## ★ Absorber (Uni-directional)



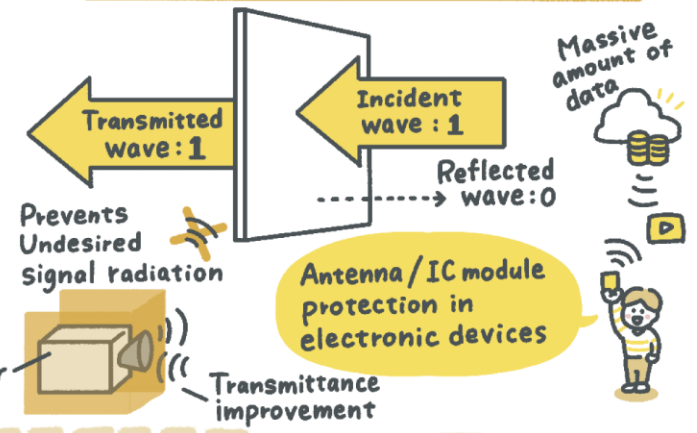
## ★ Reflector (Uni-directional)



## ★ Radome (Bi-directional)



Target: 100% transmittance, 0% reflectance



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**Research for whom?**

- Coverage improvement
- Transmittance improvement (For desired frequencies)
- Reducing undesired signal radiation For those interested in achieving these

**Research motivation**

Radio-wave absorbers were needed for improving measurement accuracy at 300GHz band.

**Future Prospects**

Wide-band/Multi-functional devices with increasing operating frequencies