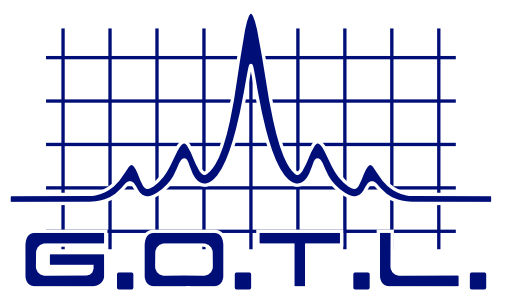


# Cost-effective high pass filter for dielectric rod waveguides



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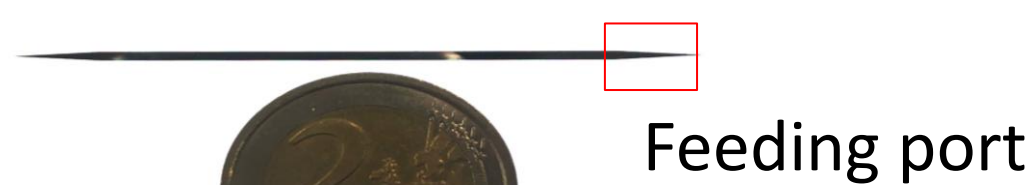


## Motivation

- All-silicon dielectric rod waveguides → promise for integrated systems → mm-wave and terahertz regions
- Terahertz frequencies will be used for 6G
- Frequency-agile filters will be highly beneficial
- In this work, we demonstrate an inexpensive, contactless technique for reconfigurable mm-wave DRW filter

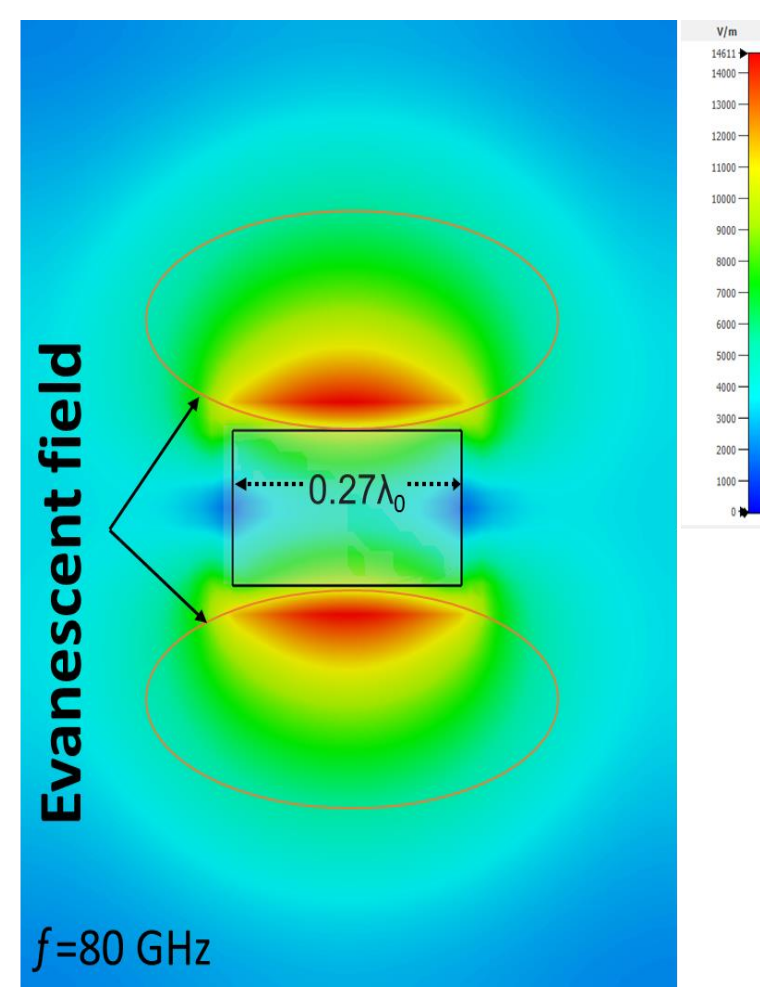
## Contactless manipulation

- Unshielded → evanescent fields



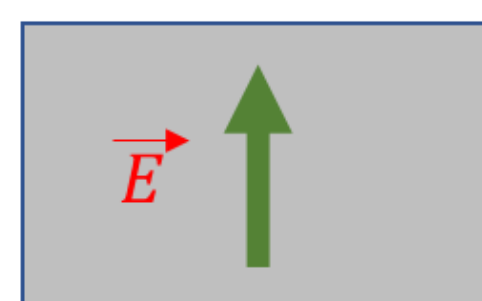
Dielectric rod waveguide(DRW)

- Interfere with evanescent fields → influence propagating waves.
- No modification to DRW → reconfigurable, contactless manipulation



## Principle of operation

- Sandwich DRW between metal

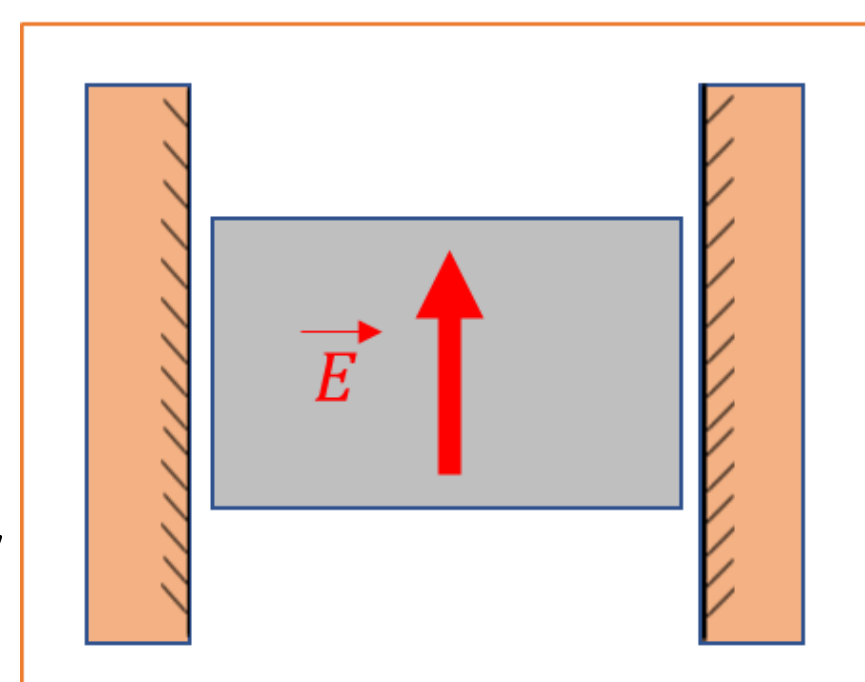


$F_c = 46 \text{ GHz}$

- Tangential E-field vanishes

- Cut-off frequency increases

- Contactless /Reconfigurability with separation.



$F_c = 87 \text{ GHz}$

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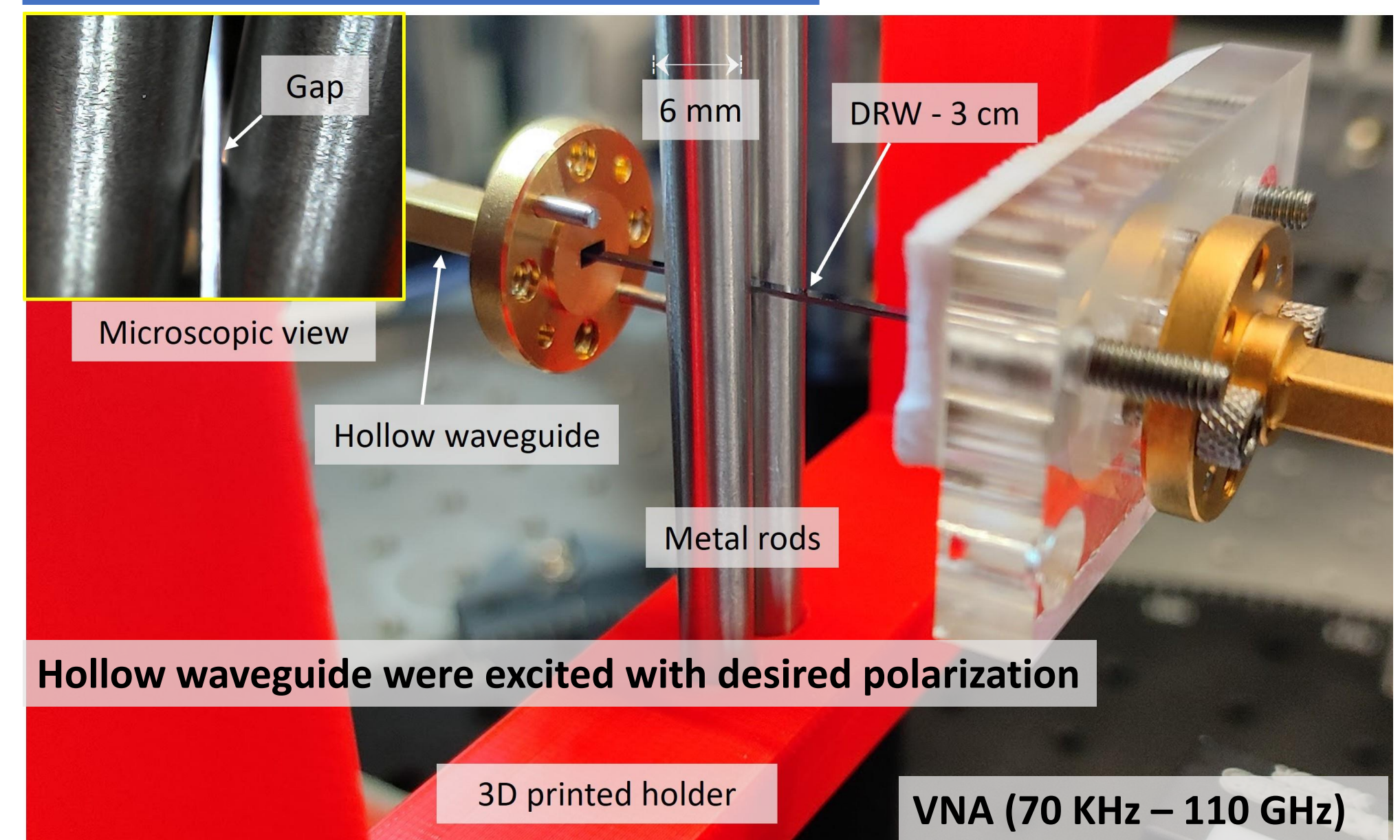
➤ Research Executive Agency (REA) Grant Agreement No: 862788 (TERAmeasure project) under Horizon 2020 Excellent Science.



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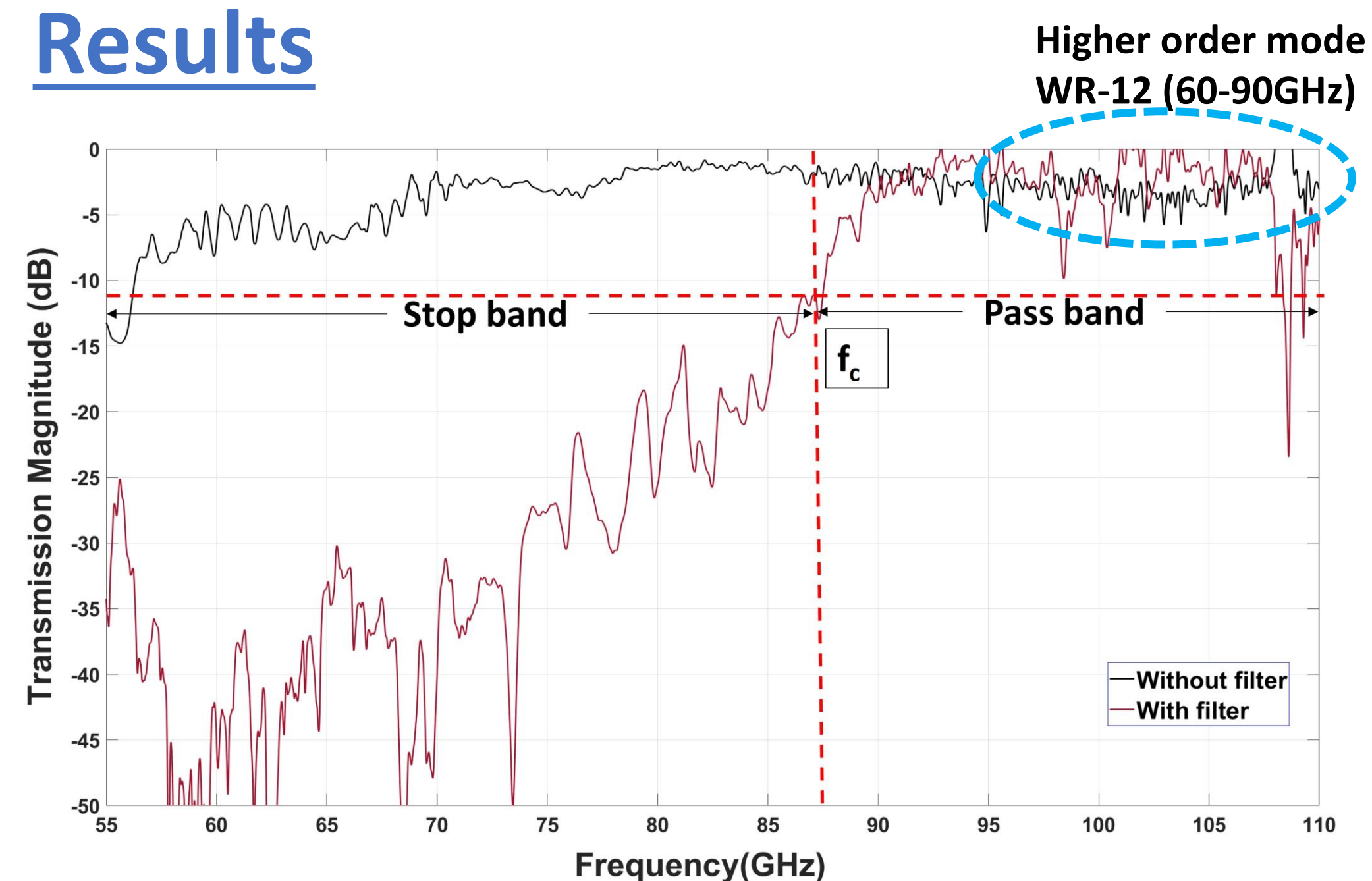


## Experimental setup



VNA port 1 → W1coax → WR12 → foam → DRW → WR12 → w1coax → VNA port 2

## Results



Attenuated low frequency → working High pass filter

## Conclusion

- Inexpensive technique for filtering lower frequencies in mm-wave DRWs using two inexpensive metal posts.
- Evanescent manipulation -> Contactless and reconfigurable.

### Further work

- Potential to adapt to Terahertz technology.
- Precise Motorized control and packaging → higher accuracy
- Incorporate into terahertz communications systems

## References

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