



SPECTROHM

A Novel Method for RF Tomography and Acquiring
Dielectric Signatures for Security Applications

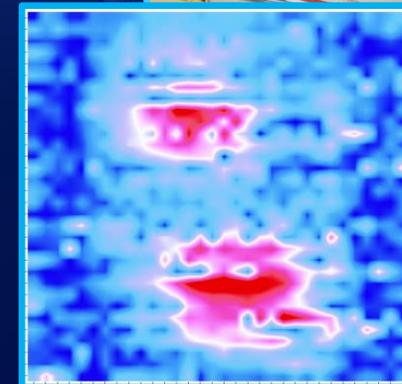
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<https://Spectrohm.com>

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So What? Who Cares?

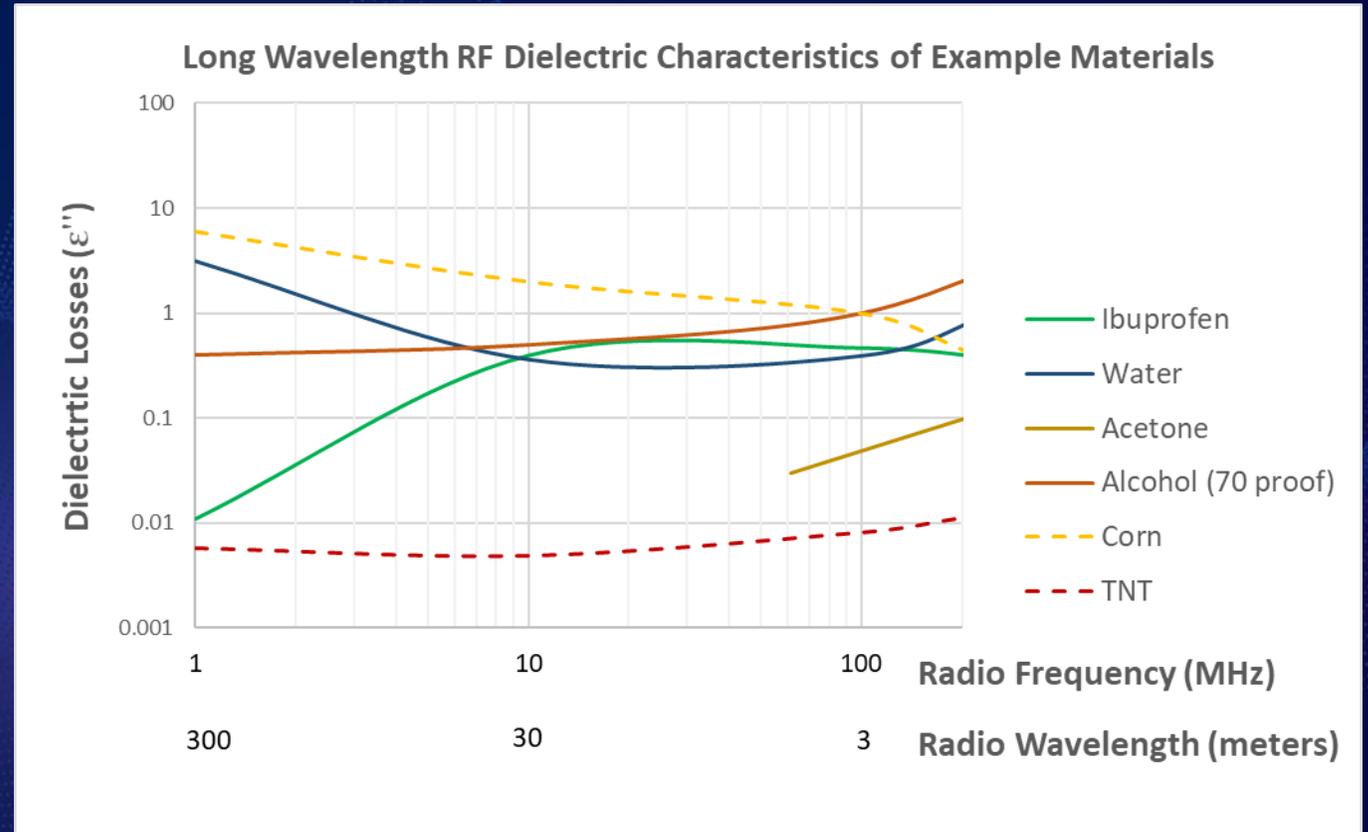
- **Space:** *detection of explosives and contraband in luggage (TSA) and packages (CBP)*
- **Problem:** *need improved speed, detection (PD/PFA)*
- **Solution:** *measure dielectric spectra of potential threats with Transmission Line Tomography--using long, penetrating radio wavelengths to gather material-identifying dielectric spectral information at sub-wavelength resolutions*
- **Results:** *benchtop discrimination of deeply concealed water-based vs flammable products by dielectric constant*
- **TRL:** 3-4



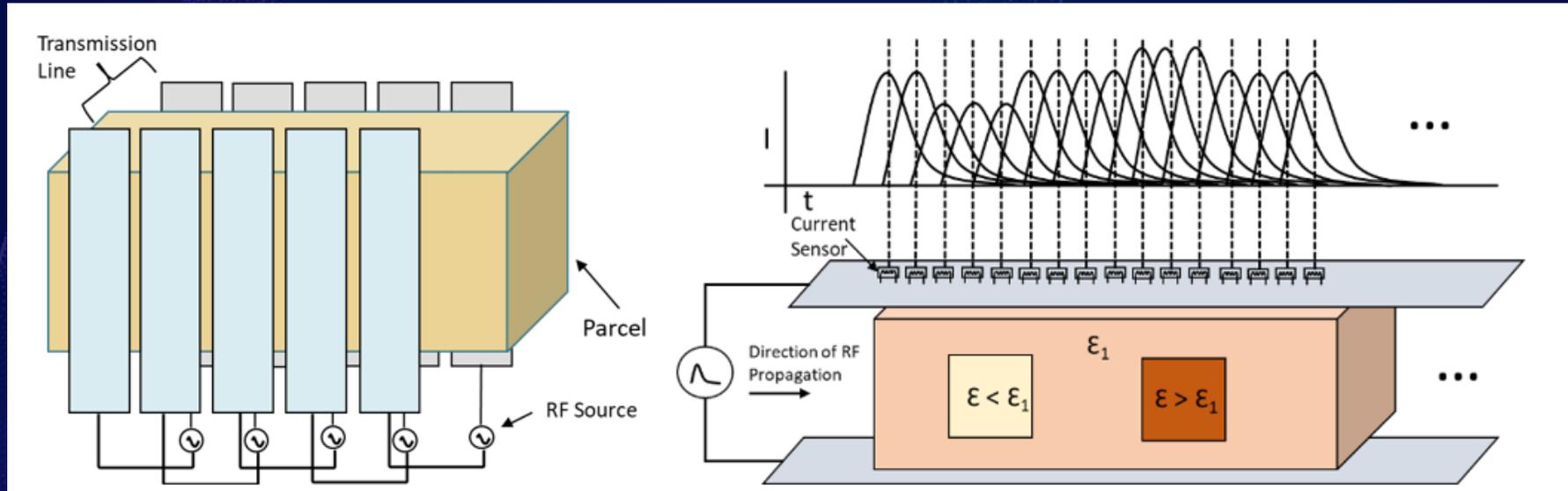
Radio Frequencies Can Both Image and Also Gather Material-Identifying Dielectric Spectral Information

But there has been a capability tradeoff between short and long radio wavelengths:

- Short wavelengths (MMW, 30GHz) image well, but have difficulty penetrating thick or lossy materials
- Long wavelengths (meters, 1-1000MHz) penetrate deeper and cover many material-identifying spectra, but previously could not image



Spectrohm's Transmission Line Tomography Confines Long Radio Wavelengths to Short Dimension Waveguides to Achieve Sub-Wavelength Resolution

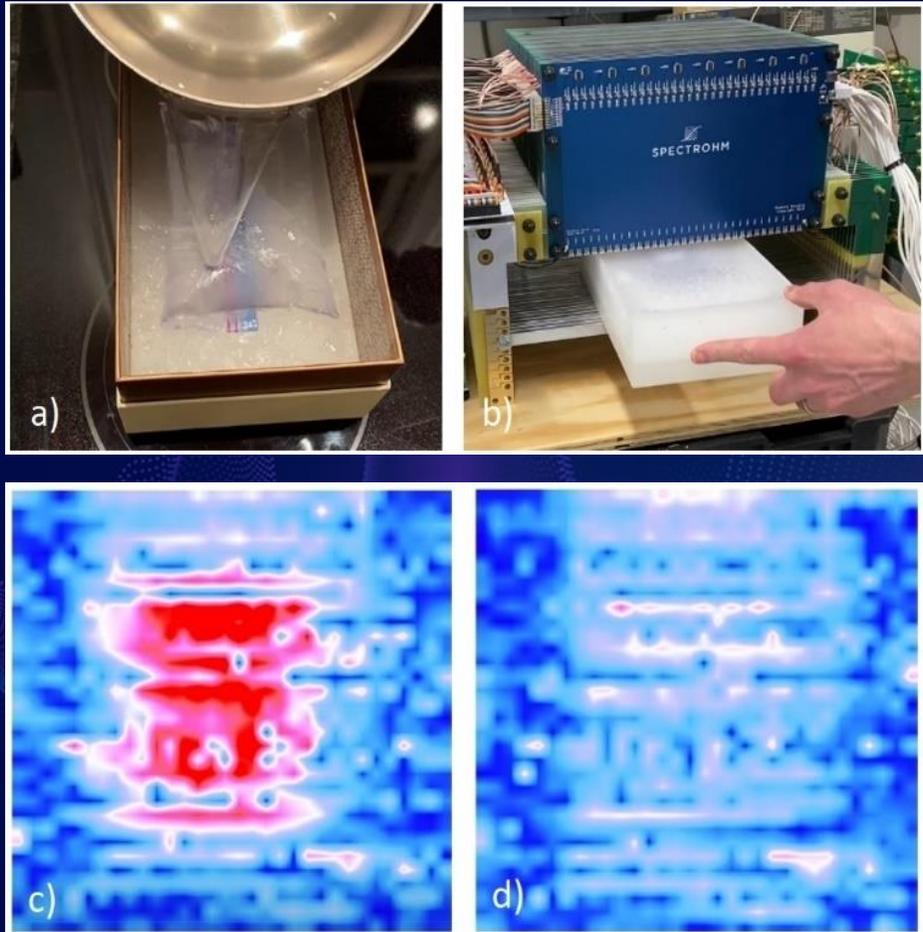


Our resolution is defined by transmission line spacing,
not wavelength

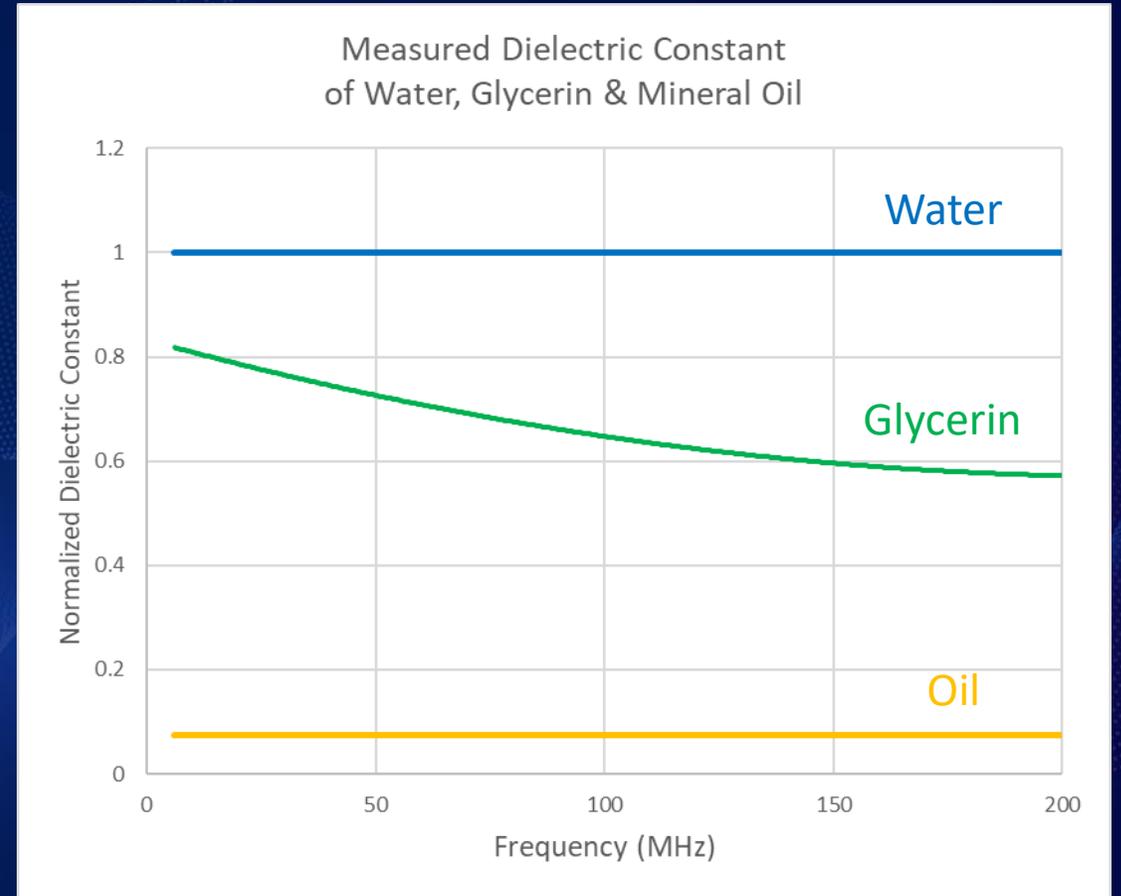
- We can achieve short wavelength-like resolutions with long radio wavelengths
- Imaging volume is between waveguiding panel structures
- No moving parts—can operate at high speed



Results



Using 30m wavelengths to image at 1cm resolution
a water baggie concealed within a cast block of wax



Dielectric spectral curves measured with
prototype system

Next Steps

Looking for partners, sponsors to help:

- Identify applications/use cases to increase TRL for a relevant environment
 - What are we looking for; what are we looking in?
- Build out dielectric spectral library for target use case
 - Access to threat materials
- Systems engineering for target use case
 - Improve sensitivity?
- Outputs and integration
 - Adjunct to existing X-ray (X-ray spatial signature + RF spectral signature)?
 - Automated threat recognition?