

THz-Jets High Resolution Transmission Imaging



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Background/Relevance

- Current cancer removal procedure involves a surgeon excising extra tissue around a predetermined area. However, this can extend patient recovery period and it does not guarantee complete tumor removal.
- Terahertz (THz) radiation's nonionizing, low scattering properties and unique interaction with water make it ideal for imaging organic tissue. Cancers high water concentration makes THz an ideal option for High resolution Imaging.

Innovation

- Using a Teflon sphere to filter the low frequencies, the higher frequencies should produce a high-resolution image.

Approach

- Using the Pin Hole in Figure 2, the THz signal would be found and then the sphere would be aligned with the Pin Hole using the holder in Figure 1.
- The resolution Kit in Figure 3 would be the test sample
- Different Sized sphere will be tested: 5mm, 4mm, and 3mm. Each sphere would also be imaged at 200um, 100um, and 50um motor step size.



Figure 1



Figure 2

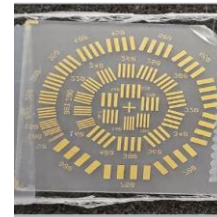
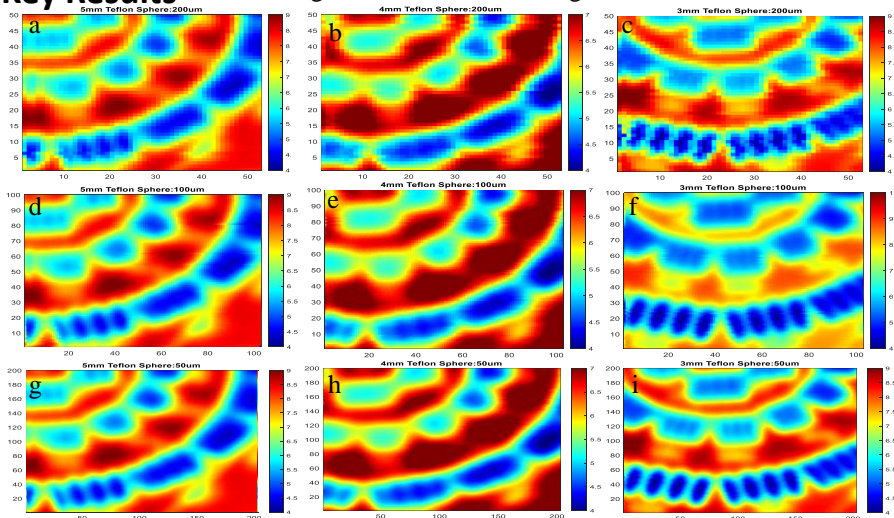


Figure 3

Key Results

Figure 4. Time Domain Signals



Conclusions

- In Figure 4: a, b, and c used a motor step size of 200um; d, e, and f used a motor step size of 100um; and g, h, and i, used a motor step size of 50um.
- Based on the results in Figure 4, the resolution of the images increased as the step size decreased. As the sphere diameter decreased the resolution also improved.
- Further work is required, such as testing different sized spheres and materials, before this method can be applied to the medical field. This experiment will have to be repeated to confirm the results in Figure 4.

This work was supported by the NSF/ESC #1948255 REU Supplement: "Efficient THz Emission Using Thin Black Phosphorous Photoconductive Absorber and Loss-free Dielectric Trapping"