Spectral Reflectance in Breast Cancer Phantoms

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Motivation

The main idea behind this project is to take measurements on phantoms in order to observe how they relate to the organic systems they are being created to mimic. These results will help in determining whether or not the method used for the phantom was successful in creating such tissue simulating objects with the tissues they were designed for.

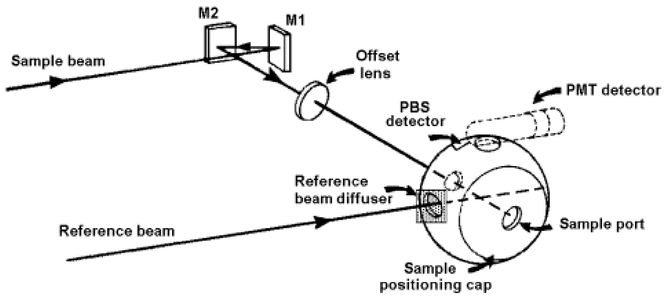
Phantoms can be used for the following [1]:

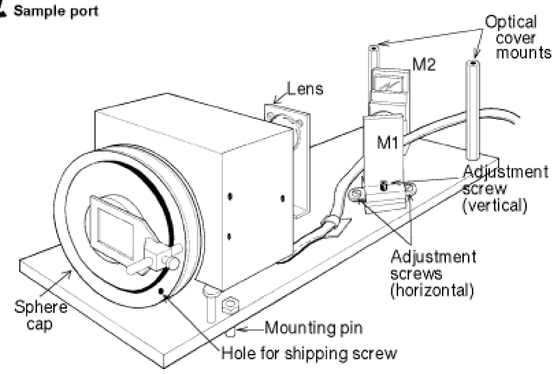
1.Testing system designs
2.Optimizing signal to noise in existing systems
3.Performing routine quality control
4.Comparing performance between systems

The method used here offers a larger scan range in which to observe how the phantom reacts to the various wavelengths.

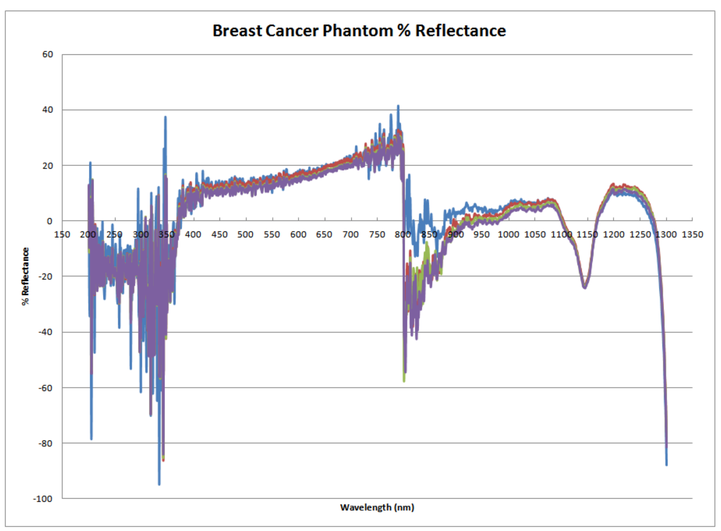
Once the phantoms are measured this provides a known substance with known composition that can be used in future work for spectroscopy in the terahertz range.

Set up





Data



Conclusions

Phantom Measurements

Unreliability of measurements at 200-350nm and 800-900nm near where sources change when taking measurements. More data is needed in these areas with attention to machine performance. Spectral reflectance is observable .

Future Work

Once success has been determined for some of the phantoms the next step is to take measurements in the terahertz range to identify the phantom reactions in this part of the electromagnetic spectrum.

Terahertz Spectroscopy

This is a relatively new area of spectroscopy use and relatively little is known about this part of the electromagnetic spectrum with respect to its within this use.

There are potentially many uses that can come from this part of the spectrum such as [2]:

- Mail/luggage scanners
- Foreign bodies in foods
- Determine glass transition of polymers
- Quality control of tablet coatings in the pharmaceutical industry

The goal of the future work would be to explore the terahertz range with the known phantoms to determine their spectra.

Acknowledgements

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References

[1] Pogue, Brian W., and Michael S. Patterson. "Review of tissue simulating phantoms for optical spectroscopy, imaging and dosimetry." *Journal of Biomedical Optics* 11, no. 4 (2006): 041102-041102.
[2] Jepsen, P. Uhd, David G. Cooke, and Martin Koch. "Terahertz spectroscopy and imaging–Modern techniques and applications." *Laser & Photonics Reviews* 5, no. 1 (2011): 124-166.

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