PURDUE INNOVATES | Office of Technology Commercialization

3D Printed Phantoms for Testing, Evaluating, and Calibrating Optical Imaging Methods

A fast, cost-effective 3D printing technique creates complex, customizable phantoms with biological tissue-matching optical properties for calibrating and evaluating optical imaging systems.

Phantoms are objects that are scanned or imaged in the field of medical imaging to evaluate, analyze, and tune the performance of various imaging devices. Phantoms are more readily available and provide more consistent results than the use of a living subject or cadaver and limits exposure to the living. Most phantoms are made using injection mold methods, which limits the shape of phantoms to the mold geometry. Molds also make it very difficult or impossible to introduce complex inhomogeneities within the phantom.

Purdue University researchers have developed a method for fabricating phantoms for optical imaging that allows design of the material's optical properties (scatter and absorption). By using 3D printing with stereolithography, a water tight phantom with complex geometry and no air gaps can be made. The optical properties can be designed to match those of biological tissues. This method allows for the placement of complex inhomogeneities in a complex geometry, making it ideal for testing, evaluating, developing, and calibrating imaging methods and equipment.

Advantages:

-3D printing method is fast and less expensive

-Allows for complex inhomogeneities

-Optical properties can match those of biological tissues

Potential Applications:

-Phantoms for testing, evaluating, and calibrating optical imaging methods

TRL: 5

Technology ID
2017-WEBB-67626

Category
Materials Science & Nanotechnology/Biomedical & Bioinspired Materials

Authors
Brian Z Bentz
Kevin Webb

Further information
Patrick Finnerty
pwfinnerty@prf.org

View online

Intellectual Property:

Provisional-Patent, 2016-10-17, United States | Utility Patent, 2017-10-12, United States

Keywords: 3D printed phantoms, optical imaging phantoms, medical imaging devices, stereolithography, complex inhomogeneities, biological tissue properties, tissue mimicking phantoms, imaging calibration, imaging evaluation, custom phantoms