

## AbstractID: 11052 Title: Fabrication and testing of an agar-based heat-sensitive gel for thermal dosimetry

**Purpose:** To develop a novel heat-sensitive gel made of non-toxic materials that can be used to measure heat resulting from illumination of gold nanoshells/nanorods with near-infrared (NIR) 808 nm laser. **Method and Materials:** The heat-sensitive gel is made by mixing 1.5 weight percent agar in distilled water and the solution is allowed to mix completely while heating it to 90 °C. Once the agar has completely melted and the solution becomes clear, it is allowed to cool to 50 °C, when 20-30 weight percent bovine serum albumin (BSA) is added to the agar mixture. The gel can be poured into any container or mold and allowed to solidify to become various shapes of phantoms. BSA is a heat sensitive protein that will undergo denaturing and result in an optical density change at the areas where temperature exceeds 70 °C. The phantom made of this gel can contain a small cavity where gold nanoshells and nanorods will be concentrated to simulate the tumor. The phantom can be read with T2 weighted magnetic resonance imaging (MRI) for quantification and visualization of heat damage around the cavity due to NIR laser illumination. **Results:** The agar based gel has shown to be heat-sensitive and T2 weighted MRI imaging can be used to visualize the permanent heat damage. The average T2 value corresponding to the damaged areas was 90.2 ms compared to 78.9 ms to non-damaged sites. **Conclusion:** The agar based heat-sensitive gel has the thermal stability to withstand relatively high temperatures. It also can be made easily for the experimental verification of various clinical applications without using any toxic chemicals which are required for many existing heat-sensitive gel recipes.

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