October 9, 2022

Prof. Jie Tian, Editor-in-Chief

Prof. Sina Farsiu, Deputy Editor

Biomedical Optics Express Editorial Office

**Re: Research Article “Photon-counting CT Thermometry via**

**Material Decomposition and Machine Learning” by**

**Nathan Wang, Mengzhou Li, and Petteri Haverinen**

Dear Dr. Wang and Dr. Farsiu,

We are submitting the above-referenced manuscript to your journal.

In this work, for the first time we report the feasibility of photon-counting CT thermometry. CT has great potential for monitoring thermal ablation therapies. However, current CT thermometry methods rely on inaccurate calibration specific to a limited number of tissue/organ types. In our work, we use photon-counting CT to perform spectrally sensitive decomposition and measure the attenuation of our base materials (water, 50mM CaCl2, and 600mM CaCl2 in this study) as a function of temperature. Then, we train a neural network to model the nonlinear relationship among composition, temperature, and attenuation. Our network trained on experimental data was then tested on new samples (300mM CaCl2 and a milk-based protein shake) with a mean absolute error of 1.80°C and 3.97°C respectively. We are excited about this new dimension added to the emerging photon-counting CT technology.

For your convenience, might we suggest some potential reviewers who are CT experts?

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Thank you for your consideration and look forward to hearing from you. Very best regards.

Sincerely yours,

Nathan Wang

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