Reviewer's comments to author(s) Paper No. IHTC15-9052

(Please attach additional sheets, if needed.)

This paper as the title tells it introduces the fourth mode of heat transfer.

The topic is very interesting. As described in the abstract, "the fourth mode of heat transfer requires coating the surface of the material with a nanoscale layer of a material having a higher refractive index". QED is known as a quantum theory for light and matter interaction. The paper doesn't clearly describe how this theory is applied to the heat transfer. As the reviewer knows, the radiative heat transfer at micro/nano scale will violate the classic Planck's law due to the effect of interference and photon tunneling effect. This branch of radiation heat transfer is currently well known as near field thermal radiation. It has been well studied under the framework of fluctuational electromagnetics, also with good experiment verification. The QED may be another theoretic framework to study the photon tunneling effect at micro/nano scale.

As is mentioned, there has been a lot progress in the study of near field radiation enhancement. The paper doesn't give a good description of the closely related work of near filed radiation heat transfer. There are a lot of good references, some of the references are listed below. The author should give a good description or comparison of the previous work in the introduction, as the radiation enhancement at micro/nano scale is not a totally new topic.

1. Pendry, J.B., 1999, "Radiative Exchange of Heat Between Nanostruc-tures," Journal of Physics: Condensed Matter, 11(35), 6621–6633.

2. Rousseau, E., Siria, A., Jourdan, G., Volz, S., Comin, F., Chevrier, J., and Greffet, J.J., 2009, "Radiative Heat Transfer at the Nanoscale," Nature Photonics, 3(9), 514–517.

3. Shen, S., Narayanaswamy, A., and Chen, G., 2009, "Surface Phonon Polaritons Mediated Energy Transfer Between Nanoscale Gaps,"Nano Letters, 9(8), 2909–2913.

4. Volokitin, A.I., and Persson, B.N.J., 2001, "Radiative Heat Transfer Between Nanostructures,"Physical Review B, 63(20), 205404.

5. Volokitin, A.I., and Persson, B.N.J., 2004, "Resonant Photon Tunneling Enhancement of the Radiative Heat Transfer,"Physical Review B, 69(4), 045417.

6. Joulain, K., Mulet, J.P., Marquier, F., Carminati, R., and Greffet, J.J., 2005, "Surface Electromagnetic Waves Thermally Excited: Radiative Heat Transfer, Coherence Properties and Casimir Forces Revisited in the Near Field," Surface Science Reports, 57(3–4), 59–112