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### The causal link between nano-toxicology and human health: DNA damage by UV emission from nanoparticles

The causal link between nano-toxicology and human health is proposed to be the scrambling of genes in DNA by UV radiation from NPs heated in the gut upon the ingestion of food. NPs stand for nanoparticles. By classical physics, NPs conserve body heat by changing temperature. QM differs as the Planck law requires the NP atoms have vanishing heat capacity thereby precluding any change in temperature. QM stands for quantum mechanics. Instead, NPs conserve heat by the emission of EM radiation. For heat capacity to vanish; however, the NP atoms must be placed under nanoscale EM confinement. But NPs having high surface-to-volume ratios confine absorbed body heat almost entirely to their surfaces, the surface heat thereby providing the EM confinement of NP atoms over nanoscale wavelengths. QED then conserves the surface heat by creating EM radiation standing between diametrically opposite NP surfaces, but differs from the complex relativistic QED by Feynman and others. Briefly stated: QED conserves heat supplied to a NP absent heat capacity by creating EM radiation having half-wavelength  $\lambda/2=nd$ , where  $n$  and  $d$  are the refractive index and diameter of the NP. For example, QED induces silver NPs having diameter  $d=90$  nm and  $n=1.35$  to emit UVC radiation near  $\lambda=254$  nm - a lethal level for DNA damage, and if the scrambled genes are not repaired by the immune system it may lead to cancer, birth defects, etc. QED does not rely on UV produced by speculative multi-IR photon up conversion as the UVC is directly excited. Figure 1 illustrates the UV emission from a layer of 50 nm silver NPs measured by a UVC light meter. The toxicity of NPs in GM food is briefly discussed. GM stands for genetically modified.

### Biography

Thomas Prevenslik developed a theory of QED based on QM. By this theory, heat absorbed by NPs is deposited almost entirely in their surfaces because of high surface-to-volume ratios. NP atoms are therefore placed under high EM confinement over nano-scale wavelengths that by the Planck law of QM precludes the atoms from having the heat capacity to conserve heat by changes in temperature. Instead, EM confinement converts the surface heat into standing EM radiation inside the NPs, any NP quantum states having lower transition frequencies than the standing EM radiation frequency are indirectly excited with emission to the surroundings. In the instant topic of nanotoxicology, the emission of standing EM radiation at UV levels damages nearby DNA and by scrambling genes establishes the causal link to diverse human health problems.

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