

Potential Cancer Therapy using Terahertz Radiation

Joo-Hiuk Son
University of Seoul

Abstract

Terahertz radiation is useful for medical imaging owing to its non-ionizing characteristics to biological molecules. Terahertz cancer imaging utilizes the amplitude and/or phase changes due to the variation of cell structures and water contents around cancerous tumor. In the effort to find cancer specific signal with terahertz radiation, it is observed that various cancer DNAs give a resonant feature around 1.6 THz. The resonance is believed to originate from hyper-methylation of DNA in cancer cells. An epigenetic change, DNA methylation, occurs ahead of genetic mutation in the process of cancer development. It is known that the demethylation of cancer DNA, using pharmaceutical demethylation agents, helps cure cancer effectively although they have a long list of side effects. We have shown that 1.6-THz radiation is also effective in reducing the level of DNA methylation in the cancer cells and tissues as well as in the extracted DNAs. In this paper, all the details of terahertz demethylation of cancer DNAs are presented, which may lead to the treatment of cancer using terahertz radiation.