



Cold Plasma Delivery for Cancer Therapy

Zhitong Chen^{1,2}

¹ National Innovation Center for Advanced Medical Devices, Shenzhen 518000, China

² Institute of Biomedical and Health Engineering, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China
e-mail: zt.chen@nmed.org.cn

Cold atmospheric plasma (CAP), operating at atmospheric pressure and room temperature, has remarkable potential for biomedical applications through various delivery methods. The biomedical applications include sterilization, wound healing, blood coagulation, oral/dental diseases treatment, and immunotherapy, especially for cancer therapy [1, 2]. The CAP efficacy in the proposed applications depends on the synergy effect of free radicals, electric fields, reactive oxygen species (ROS), reactive nitrogen species (RNS), charged particles, and UV photons [3, 4]. The essential roles of ROS/RNS as biologically and therapeutically active agents in a wide variety of intercellular and intracellular processes have become increasingly clear in past years. Effective delivery of plasma constituents is critical to its efficacy for cancer therapy. Here, this talk introduces the key research activities related to plasma delivery, including direct CAP delivery, delivery of plasma-activated media, biomedical device-assisted plasma delivery, and CAP delivery with other therapeutics [5].

References:

- [1] Chen, Z., & Wirz, R. E. Cold Atmospheric Plasma (CAP) Technology and Applications. Morgan & Claypool Publishers, 2021.
- [2] Chen, Z., Simonyan, H., Cheng, X., Gjika, E., Lin, L., Canady, J., ... & Keidar, M. A novel micro cold atmospheric plasma device for glioblastoma both in vitro and in vivo. *Cancers*, 9(6) (2017) 61.
- [3] Chen, G., Chen, Z., Wen, D., Wang, Z., Li, H., Zeng, Y., ... & Gu, Z. Transdermal cold atmospheric plasma-mediated immune checkpoint blockade therapy. *Proceedings of the National Academy of Sciences*, 117(7) (2020) 3687-3692.
- [4] Chen, G., Chen, Z., Wang, Z., Obenchain, R., Wen, D., Li, H., ... & Gu, Z. Portable air-fed cold atmospheric plasma device for postsurgical cancer treatment. *Science advances*, 7(36) (2021) eabg5686.
- [5] Chen, Z., Chen, G., Obenchain, R., Zhang, R., Bai, F., Fang, T., ... & Gu, Z. Cold atmospheric plasma delivery for biomedical applications. *Materials Today* 54 (2022) 153-188