Auburn University

Innovation Advancement & Commercialization

Enhancing smell using metal nanoparticles

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Reference: Olfactory response

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References

- Chemical Senses (2009) 34(7): 547-557 (Link)
- Talanta (2012) 88: 730-733 (Link)
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Overview

Fragrances are used worldwide in many household consumables and foods to enhance taste and perception. The global market for fragrances was $11 billion in 2011 and continues to grow due to demand from emerging markets. Work at Auburn University has shown that zinc metal nanoparticles with a net neutral charge enhance the olfactory response. Production of the nanoparticles is inexpensive and only a small amount is needed. Because taste is about 70% smell, these nanoparticles could improve the consumer experience in both smell and taste. The nanoparticles may also cut costs by reducing the amounts of perfumes or odorants needed to provide a positive consumer experience.

Advantages

- Enhancing: increases the olfactory perception of fragrances and odors
- Inexpensive: very little material is required to have an effect
- Temporary: enhancement effect is not permanent

Description

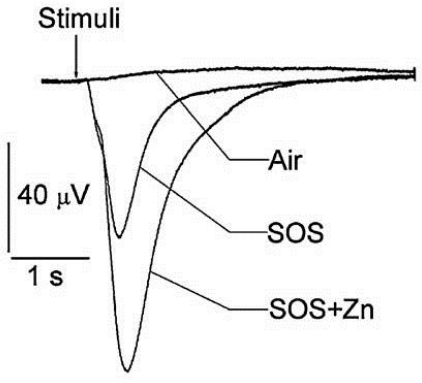
Animals perceive smell when an odor molecule binds to an olfaction G protein-coupled receptor. The receptor induces an electric current to travel along nerves to the olfactory bulb of the brain, where the smell is perceived. Metallic zinc nanoparticles of a neutral charge enhance smell by increasing the neurological signal caused by an odor. Olfactory tissue responses *in vitro* were multiplied in response to zinc and odor perception in the brains of live dogs was enhanced, as shown by MRI. These nanoparticles could enhance the consumer experience, be used to assist in the detection of illegal substances by security dogs, or aid in cases of anosmia (loss of smell).

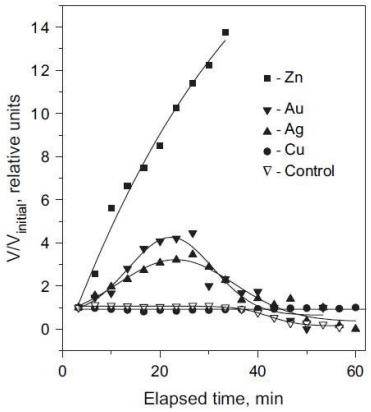
Status

- Effects of zinc nanoparticles demonstrated *in vitro* and *in vivo* (canines)
- Issued US patents 8,273,381, 8,778,409 and 9,132,086)

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture





Olfactory Tissue Response to Zinc Nanoparticles Plus Odorant. (Left) Electrical potential response of olfactory tissue to Air, Odorant (SOS) or Odorant + Zinc (SOS+Zn). **(Right)** Relative electrical potential response of olfactory tissue to different metals. Zn (zinc), Au (gold), Ag (silver), Cu (copper), Control = no metal. Y-axis reports the fold increase (e.g. 4 relative units = 4 times greater response than control)