

## **Hand sanitization using plasma technologies**

### **Most of my research is in a notebook in person this is just some of my research**

#### - Plasma Definition and Types

- Plasma is an ionized gas with free electrons and positively charged ions.
- It can be thermal (superheated) or cold (non-thermal), with cold plasma being suitable for hand sanitization due to its near-room temperature operation.

#### - Generation of Plasma

- Plasma is generated by applying enough energy to gas (argon, helium, or air) in a low-pressure environment using a high-voltage power source.
- It requires a vacuum pump and specific conditions (pressure, gas type) to create.
- Cold plasma can be produced on-site as needed, making it practical for applications like hand sanitization.

#### - Storage Challenges

- Plasma cannot be stored easily due to its high energy and temperature, necessitating real-time generation for specific applications.

#### - Device Operation and Use

- The sanitization device would function similarly to a hand dryer but uses cold plasma or plasma-activated water for disinfection.
- It activates automatically when a user places their hands within range, emitting a plasma stream to disinfect hands.
- The device is designed to be safe, with cold plasma operating at safe temperatures for human touch.

#### - On-site Plasma Generation

- Advances in miniaturized plasma generation technology enable the integration of compact plasma sources within the device.
- Continuous generation during operation is achieved, eliminating the need for storage.

#### - Power Source and Placement

- Devices could be powered by standard electrical outlets or hardwired, with considerations for energy efficiency and backup power solutions.
- Ideal for public spaces like restrooms, healthcare facilities, educational institutions, and transportation hubs to promote hygiene.

#### - Environmental and Health Benefits

- Offers a sustainable alternative to traditional sanitizers by reducing water use, waste, and harmful byproducts.
- Enhances public health safety by providing an effective and eco-friendly hand sanitization method.

#### - Safety and Occupational Considerations

- Addresses potential issues with byproducts like ozone and nitrogen, ensuring they are not harmful to users.

#### - Conclusion

- Plasma technology for hand sanitization presents a promising, sustainable, and innovative approach to maintaining hygiene and preventing disease transmission.
- Requires careful consideration of technology, safety, and energy consumption but has significant potential for widespread public health benefits.