

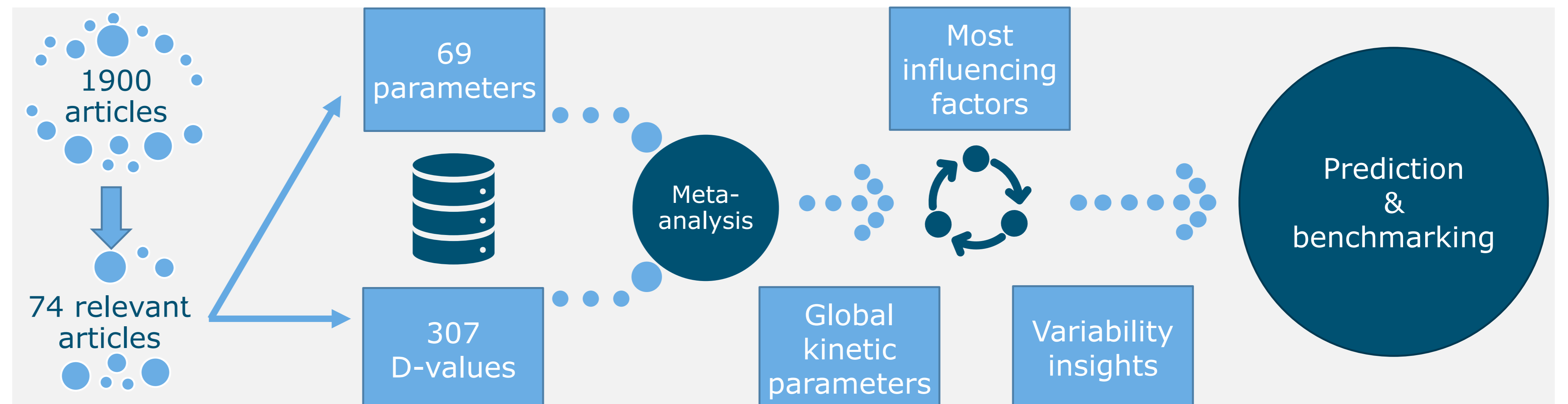
Meta-analysis on decontamination efficacy of non-thermal plasma (NTP)

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Background

- Non-thermal plasma (NTP) could be valuable in enhancing food safety while maintaining quality
- The purpose of this study is to quantify decontamination efficacy and to develop generic, predictive models

Approach



Results

The D-values (i.e., the time to reduce the concentration of cells with a factor of 10) reported in food products, solid surfaces, and laboratory media were expressed as a function of the plasma intensity. Whereas the plasma intensity was expressed through the dissipated power per plasma area. However, when not possible (i.e., for atmospheric pressure plasma jet (APPJ) setups), the surface of the sample was used instead.

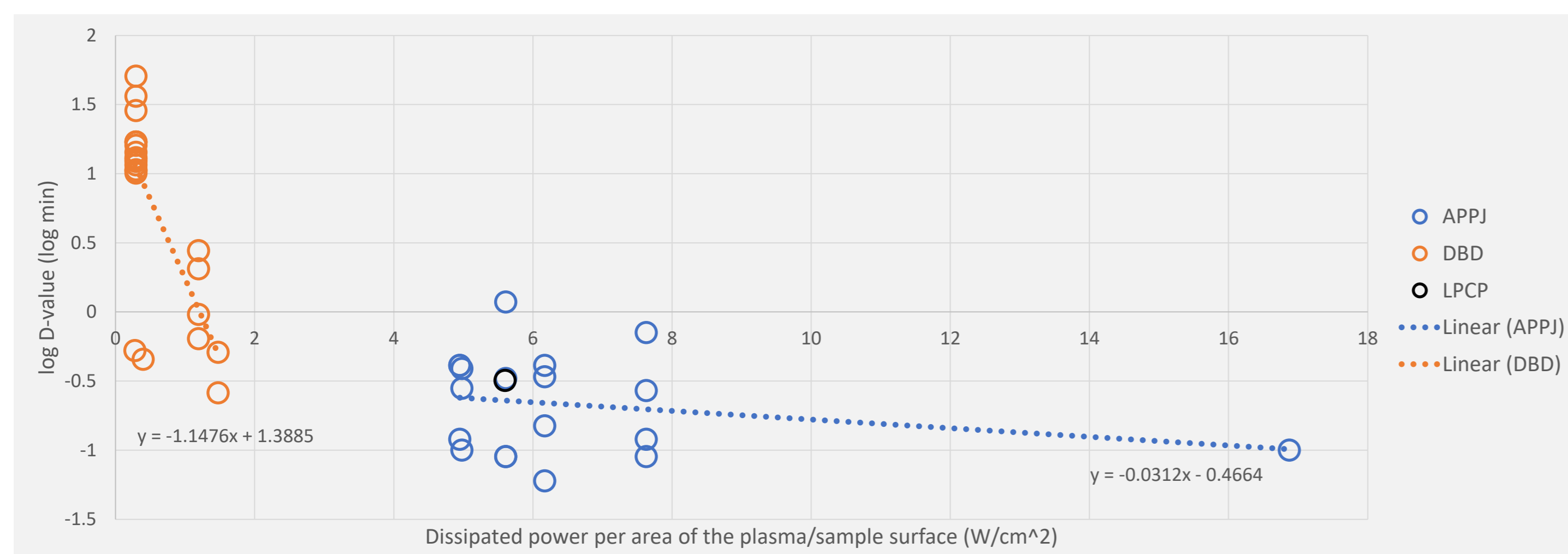


Figure 1. The effect of dissipated power in decontamination efficacy of food products, solid surfaces, and laboratory media through various non-thermal plasma setups (APPJ, dielectric-barrier discharge (DBD), and low-pressure cold plasma (LPCP)).

For the following figures, the input power was also used after being converted to estimated dissipated power using a factor of 0.4 under the conservative assumption that only 40% of the input power goes to the creation of plasma.

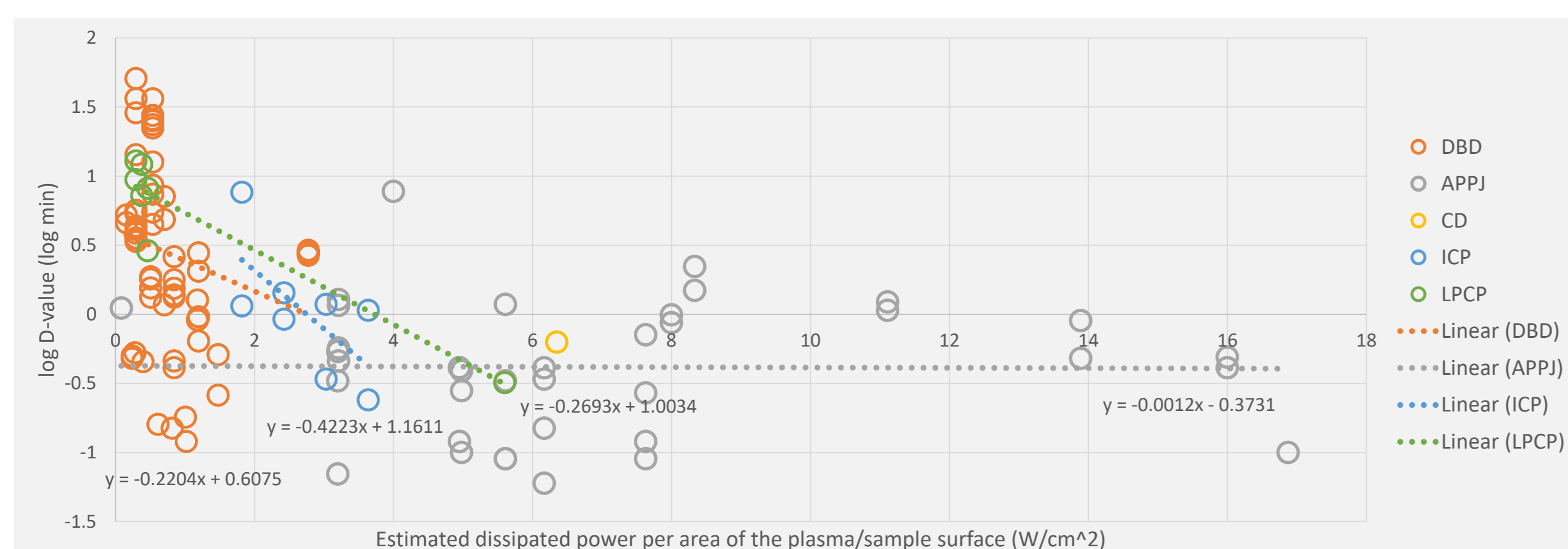


Figure 2. The effect of estimated dissipated power in decontamination efficacy of food products, solid surfaces, and laboratory media through various non-thermal plasma setups (DBD, APPJ, corona discharge (CD), inductively coupled plasma (ICP) and LPCP).

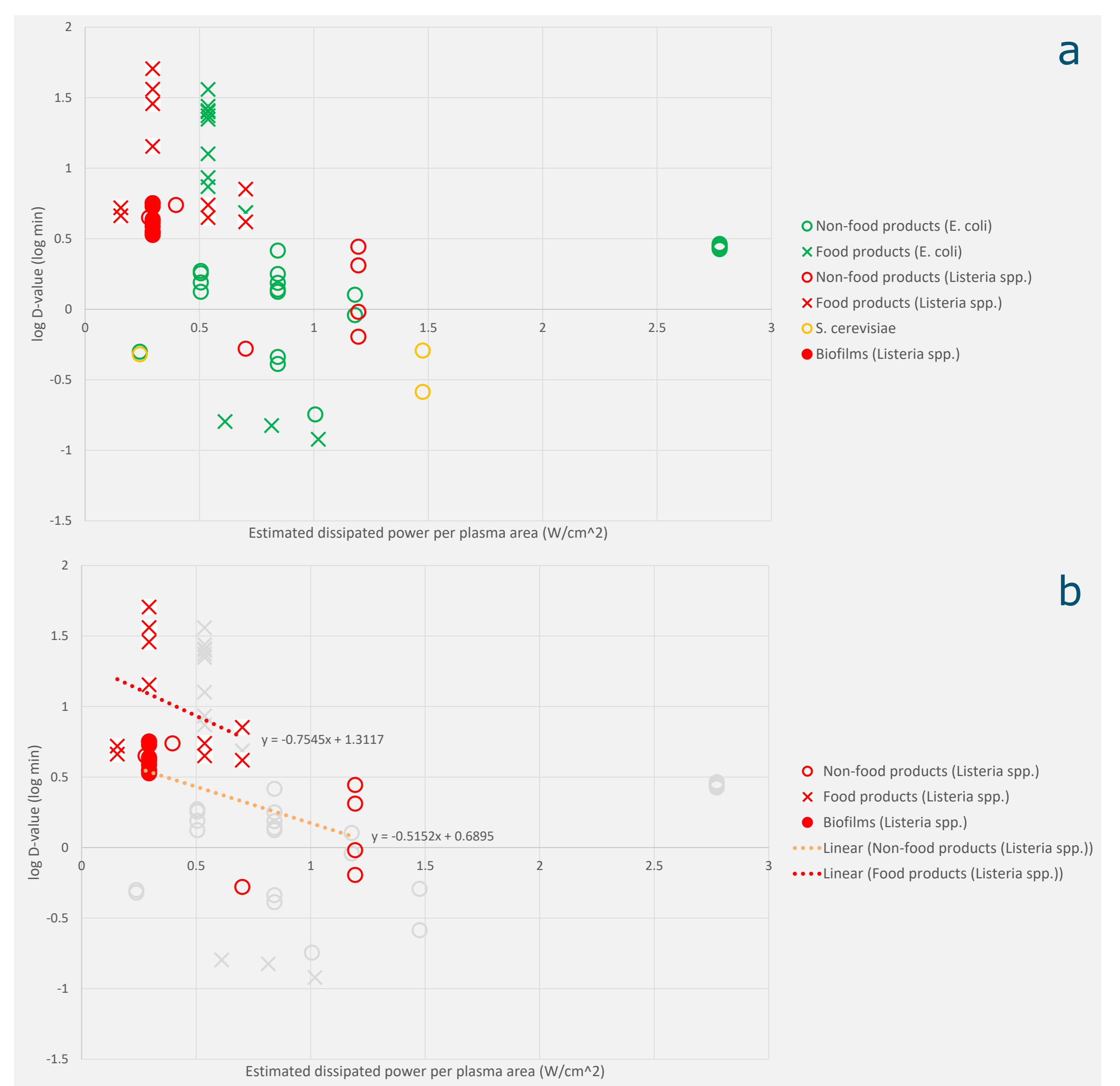


Figure 3. The decontamination efficacy of dielectric-barrier discharge (DBD) in food products, solid surfaces, and laboratory media (a) and the efficacy against *Listeria* spp. in the spotlight (b).

Conclusions

- Consistency in reporting processing parameters is highly relevant to put the technology into practice
- NTP setup accounts for a big fraction of the observed variability
- There is no great distinction in efficacy between microbial species

Acknowledgements

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 955431.



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