



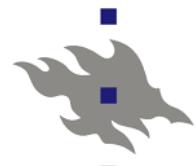
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Desktop 3D Printers: Nanoparticle Emissions

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Background

- 3D-printing are becoming more common
- Different printing techniques exist
- Most popular technique for small scale printing is based on **Material Extrusion (ME)**
 - Thermoplastic polymers as a printing material
 - Acrylonitrile Butadiene Styrene (ABS)
 - Poly-Lactid Acid (PLA)



Background

- Concernes about health and safety issues
- 3D-printers based on ME are shown to strongly emit nanosized particles (Mendes et al. 2016, Kim et al. 2015, Stephens et al. 2013)



Methods

- Measurements in an air tight chamber
 - HEPA-filtered air

Methods

- Instruments
 - Different measurement techniques
 - 1 nm →

Methods

- ABS – Acrylonitrile Butadiene Styrene
- PLA – Poly-Lactic Acid



Summary

- Printing of ABS emitted significant amount on nanoparticles
- Extruder temperature had an effect on the nanoparticle emissions



Summary

- Suitable control measures are recommended
 - Temperature control
 - Maintenance
 - Ventilation
 - Enclosure



More information

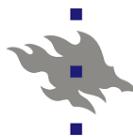
- The webpage of the research project
http://www.ttl.fi/fi/tutkimus/hankkeet/3d_tulostukse_n_kaasu_ja_hiukkaspaastot_eri_tyovaiheissa/sivut/default.aspx
- Poster by Kangas et al.



Acknowledgements and references



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Thank you!



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