

Foresight

CIRI Releases New Research Data and an Actionable Guidance Document on 3D Printing



The Chemical Insights Research Institute (CIRI) of UL Research Institutes is dedicated to rigorous and objective scientific research on chemical exposure and environmental health issues and ways to reduce exposure risks. This month we share new resources including a technical report on air quality in a university maker center with operating printers, a recent publication on metal exposure during printing and a guidance document on safely operating 3D printers in educational environments.

Hazards of 3D Printing Emissions



Did you know that over 740 volatile organic compounds (VOCs) have been detected from operating printers and that new [research data](#) indicate human toxicity effects?

The availability of 3D printing has fostered creative and innovative learning experiences for students in primary, secondary and higher education. While it offers tremendous educational opportunities, unintentional consequences of exposure to VOCs, ultrafine particles, and metal aerosols increases health risks to users and building occupants. Years of [3D printing emissions research](#) from CIRI has found that applying best practices and mitigation strategies can decrease exposures that may lead to acute and chronic health effects. Review CIRI's open-source [Data Portal](#) featuring our comprehensive research database of individual VOC and particle levels associated with 3D printers and filaments.

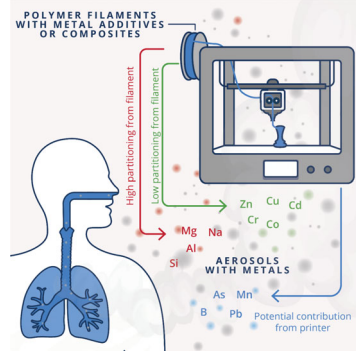
Study of Indoor Air Quality in a University Maker Center with 3D Printers



Our newest Technical Report, "[Impact of 3D Printing on Indoor Air Quality in a University Maker Center](#)," publishes details on elevated levels of particles and VOCs with over 400 different VOCs identified including formaldehyde, methyl methacrylate, tetrahydrofuran, acetaldehyde and others. These VOCs can be irritants, sensitizers, asthmagens, odorants, carcinogens, developmental toxins, and reproductive toxins that may cause adverse acute and chronic health impacts like inflammation, respiratory and neurotoxic symptoms, and cancer, depending on exposure patterns.

- Read the full [Technical Report](#).
- Learn more about potential health impacts in CIRI's recent [toxicology research report](#) on exposure to 3D printer aerosols.

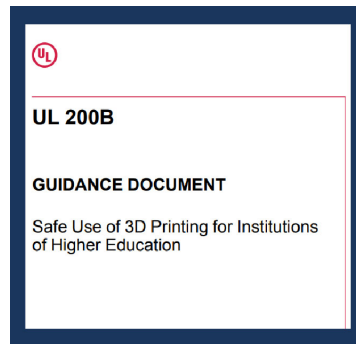
Metal Exposures from Operating 3D Printers



3D printing with filaments containing metallic additives is widely used in a variety of applications. CIRI scientists and collaborators researched and authored a peer-reviewed journal article, "[Metal Compositions of Particle Emissions from Material Extrusion 3D Printing: Emission Sources and Indoor Exposure Modeling](#)," that characterized metals transferred from filament additives to emitted particles. The study found that high levels of crustal metals such as silicon (the most abundant) and sodium were detected in the emitted particles. Heavy metals including boron, arsenic, manganese, and lead that are known to be hazardous to human health were also detected in the emissions.

- Read the full [journal article](#) in *Science of The Total Environment*.
- Learn more on how to [reduce 3D printing emissions](#).

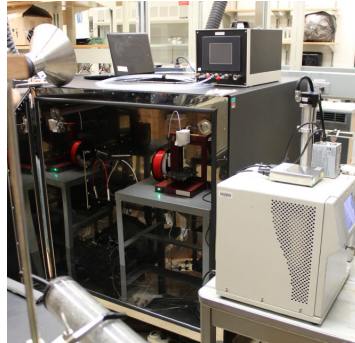
Availability of UL 200B, a New Guidance Document



This month, CIRI and the [Campus Safety, Health, and Environmental Management Association](#) (CSHEMA) published "[UL 200B: Guidance Document for Safe Use of 3D Printing for Institutions of Higher Education](#)." A working group of experts who brought together CIRI's research knowledge with professionals having decades of applied experience with campus facilities and populations developed this benchmark document. This Guidance Document empowers professionals by providing and encouraging best practices for safe use of 3D printers to manage safety and health considerations while maximizing the benefits and innovative potential of 3D printing in institutions of higher education.

- Read the [press release](#) for more information.
- Visit [shopulstandards.com](#) to access the official document.

CIRI's Upcoming Research on 3D Printing Emissions



CIRI's ongoing research into 3D printing emissions is addressing toxicity and options for reducing exposures through engineering controls. Keep an eye out for upcoming press releases, news alerts, and additions to our extensive [Resource Library](#) for information.

Publications and Events

Recent Publications



- Guidance Document, "[UL 200B: Guidance Document for Safe Use of 3D Printing for Institutions of Higher Education](#)"
- Technical Report, "[Impact of 3D Printing on Indoor Air Quality in a University Maker Center](#)"
- Press Release, "[Chemical Insights Research Institute and the Campus Safety, Health, and Environmental Management Association Publish Guidance for the Safe Use of 3D Printing in Institutions of Higher Education](#)"
- All3DP Pro Article, "[Finally, an Official Guide to 3D Printing Safety](#)"
- Home News Now Article, "[Researchers Study Human Exposure to PFAS Chemicals Used in Performance Fabrics](#)"

Upcoming Events



- [AIA Conference on Architecture 2023](#), June 7 – 10, 2023, “Research Scientists’ Perspectives on Climate Impacts for Building Environment & Materials”
- [NeoCon](#), June 12 – 14, 2023, “Building Resiliency for Health”
- [Metabolomics 2023](#), June 18-22, 2023, “Assessing the Impact of Vaping Behavior on Metabolomic Profiles, Pro-Inflammatory Responses, and Oral Health Outcomes in ENDS Users”
- [Ron Blank GreenCE Academy](#), June 23, 2023, “Research Scientists’ Perspectives on Climate Impacts for Building Environment & Materials”
- [CSHEMA Annual Conference](#), July 22 – 26, 2023, “CIRI + CSHEMA = 3D Printer Safety Guidance for Your Campus”
- [ASID GATHER 2023](#), August 13 - 15, 2023
 - “Understanding WUI and How to Protect Our Homes”
 - “Forever Chemicals: What Designers Need to Know”
 - “Reducing Fire and Chemical Risks to Safeguard Human Health”
- [ACS Fall Meeting](#), August 13 – 17, 2023, “Utilizing Cheminformatics to Determine Primary and Secondhand Vaping Exposure and Health Risks”



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