Availability and cost have reached a point where 3D printers are readily available to consumers for hobbyist and small business uses. Consumer grade 3D printers most often work with polylactic acid (PLA) or acrylonitrile butadiene styrene (ABS) thermoplastics which are available from brand name and generic suppliers. The print quality can vary widely depending on the supplier of the spool material.

X-ray fluorescence spectroscopy, X-ray diffraction, and X-ray computed tomography were used to analyze 3D printed parts made using materials from different suppliers. A PANalytical Empyrean system was used for computed tomography (CT) and diffraction analysis. X-ray computed tomography was used to measure the shape of the printed parts, with the advantage of revealing both external and internal details of the piece. X-ray diffraction was then used to measure the degree of crystallinity of the plastic, particularly for PLA's, as-received on the spool and after printing. X-ray fluorescence was used to quantify chemical composition of the materials as-received on the spool.