3D printing enables one to rapidly design and fabricate materials in arbitrary shapes on demand. I will introduce the fundamental principles that underpin 3D printing techniques. I will then describe how new functional and biological materials are vastly expanding the capabilities of 3D printing. Finally, I will highlight several emerging examples, including 3D printed electronics, lightweight composites, and vascularized tissue constructs, that demonstrate how this (still) nascent technology is being used to make the future.