Sustainable Electricity From Dirt: Microbial Fuel Cell

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Today, we are looking for a more sustainable energy source that does not negatively impact the environment, like air, water, and land pollution. We might think of wind, solar, or geothermal energy as some apparent answers to the sustainable energy problem, but there is one source that you might not think about; dirt can also be used to produce electricity. All dirt has some form of bacteria, known as electrogenic bacteria, and we can use these bacteria to produce an electric current by microbial fuel cells (MFC). We do this by harnessing the electrons that the bacteria release after they eat. We wanted to incorporate wastewater into our soil to understand if we can use MFC for wastewater treatment while producing clean electricity. MFC is an up-and-coming, portable electricity resource; however, materials such as electrodes and membranes increase the cost of MFC. For our project, we wanted to build sustainable MFC from recyclable materials such as plastic jars, pipe cleaners, saltwater, plastic tubes, garden dirt, wastewater and aluminum foil to make it accessible and reduce the cost. We created around 0.3 V electricity from 100 g of soil with 2 cm2 aluminum electrodes. Later, we modified our materials with gold and carbon electrodes and wastewater to improve the current collection and voltage generation. MFC promises energy resources, and we hope our project can help decrease its cost to make it more accessible to the most needed areas.

Awards Won:
Arconic Foundation: 3rd Award