Waste Heat Recovery Cooking Pot

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Over 70% of the households in Zimbabwe's rural areas are still not connected to the national electricity grid. These rural communities, which are a greater part of the country, meet 94% of their cooking requirements from traditional fuels, mainly firewood, using open fires and kerosene stoves. Due to the energy challenges being faced across the African continent, there is a need to develop sustainable ways to generate electricity and save energy; hence this project aimed to create a waste heat recovery cooking pot that can directly convert the waste heat released during cooking to electricity. An anodized aluminum cooking pot was integrated with plate heat exchangers and thermoelectric modules connected to galvanized pipes and a side water drainage companion box. The pot lid was air-tight and consisted of one outlet pipe, which had a non-return valve. The steam produced inside the pot during cooking was directed to the outlet of the pot’s lid then to the heat exchanger plates through the spiral series of pipes, which allowed the steam to condense back into water and lower its temperature, thus creating a cooling effect. When the thermoelectric modules encapsulated on the cooking pot are exposed to a temperature difference (waste heat from the pot and cooling from the water cooling system), electricity was generated. A circuit with a flame-resistant composite cable and connector capable of regulating, amplifying, and converting the power produced was designed. The power output can potentially be used for lights and small electrical appliances such as cellphone charging.

Awards Won:

China Association for Science and Technology (CAST): Award of $1,200

Arizona State University: Arizona State University ISEF Scholarship