熱能循環資源化轉換材料與系統開發

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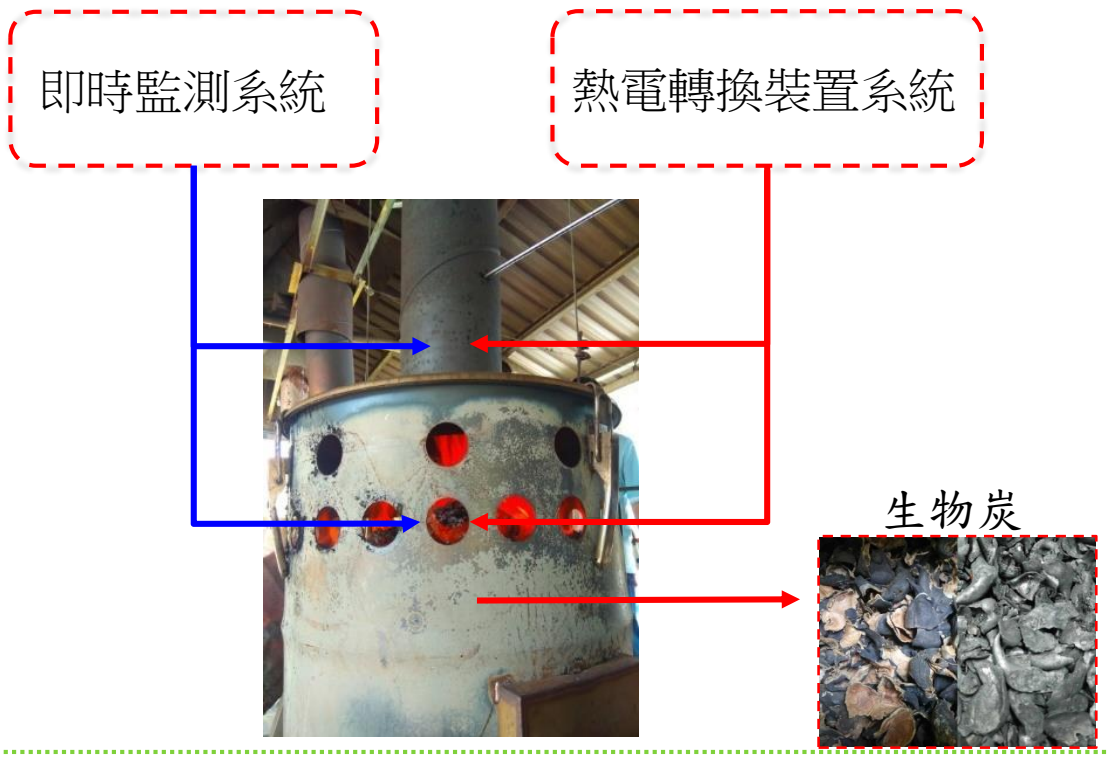
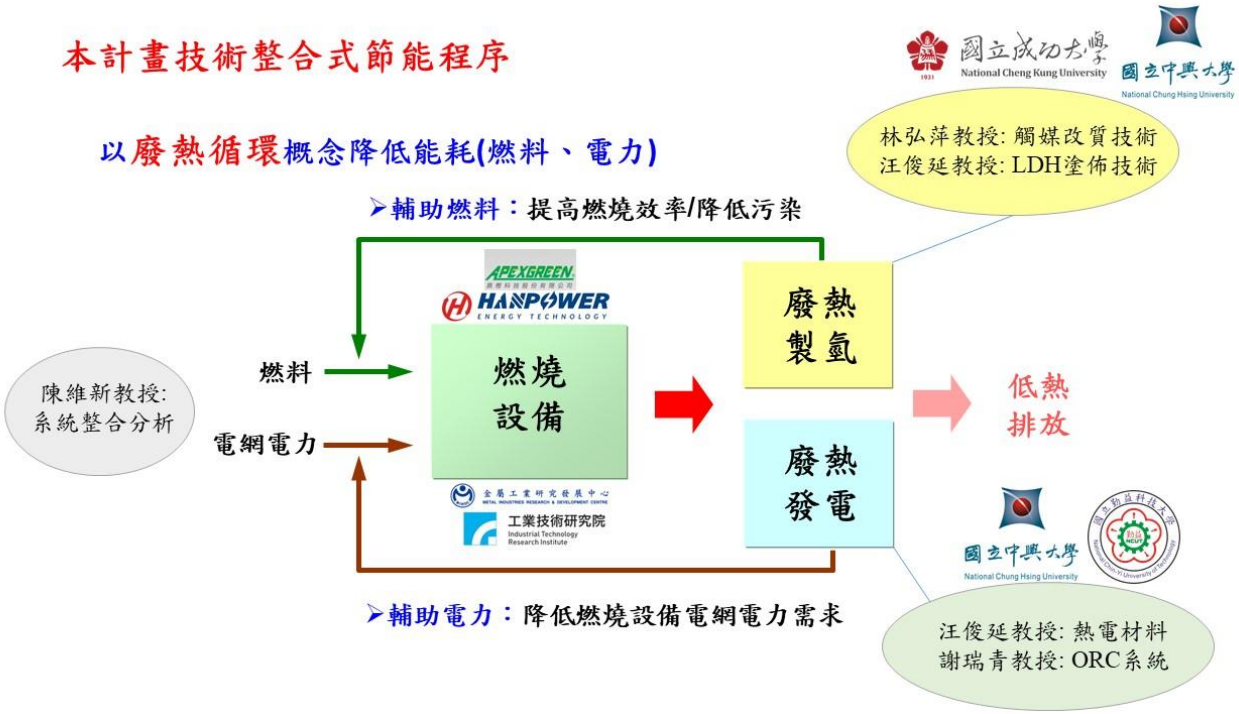
- 近幾年來，用於廢熱回收的熱電發電機的發展已成為越來越多的研究熱點。本研究整合計畫旨在開發轉換低溫的技術將熱量浪費成燃料和電力。該計畫可應用於未來的工業爐（鍋爐，熔爐，焚化爐，水泥窯）和汽油發電機，用於熱回收和熱電轉換。

1. 煙道廢熱回收之熱電設計。
2. 純矽熔解於液態鎂的方法。
3. 無模板法合成中孔洞金屬氧化鋁觸媒。
4. 穿臨界有機朗肯循環混合流體。



本整合計畫之目標在於開發適用於低溫工業廢熱之燃料轉換與發電技術，其構想在於透過化學反應將低階熱能轉換後「儲存」於燃料當中，達到回收熱能之效；而由於燃燒設備本身有一定電力需求，從低溫廢熱能轉換出電力，將可直接使用，達到降低電網電力負荷的效果。基於上述概念，本計畫在燃料轉換部分，將著重觸媒及觸媒層與反應機構接合之技術開發。在發電技術部分，將開發高性價比熱電材料，並整合熱電發電與有機朗肯循環技術，成為一種新型高效率低溫廢熱發電程序。



Conversion Material And System Development For Recycling Circular Thermal Energy

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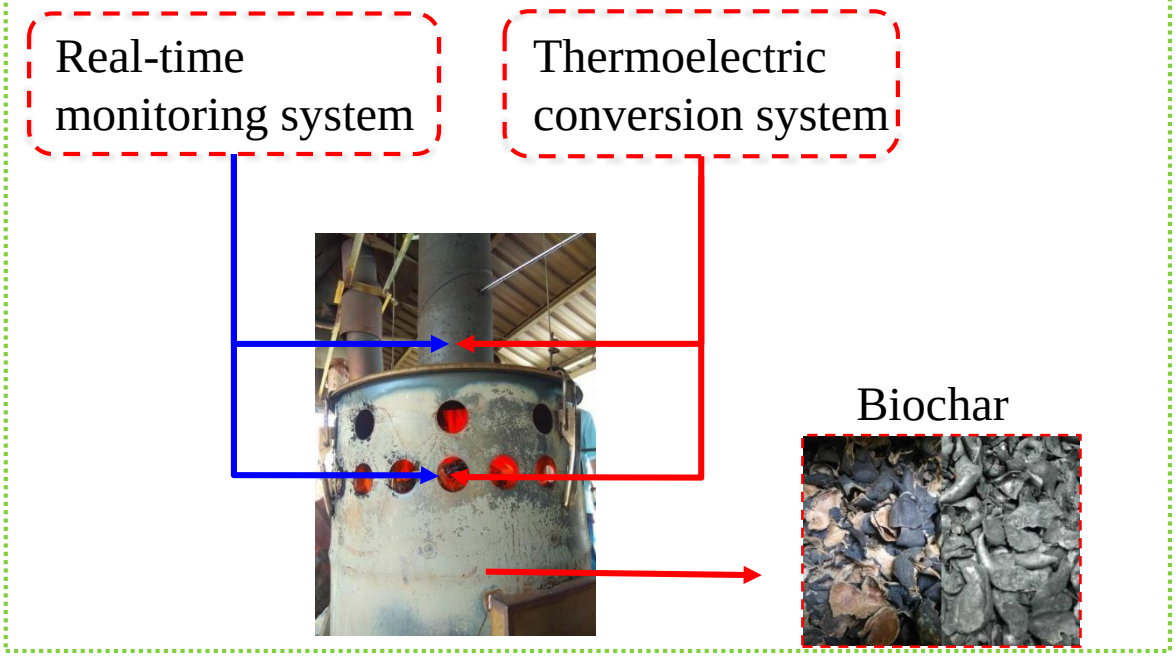
- The development of thermoelectric generators for waste heat recovery has become an increasing research focus over the past a few years. This integrated project aims to develop the technologies to convert low-temperature waste heat into fuels and electricity. This project can be applied in the industrial furnace (Boilers, furnaces, incinerators, cement kilns) and gasoline-powered generator for heat recovery to thermoelectric conversion in the future.

1. Thermoelectric design of waste heat recovery from flue.
2. Melting of pure silicon in liquid magnesium.
3. Template-free synthesis of mesoporous alumina catalyst.
4. Zeotropic Mixtures for transcritical organic Rankine cycle



This integrated project aims to develop the technologies to convert low-temperature waste heat into fuels and electricity. For fuel conversion, chemical reactions will be triggered to accomplish fuel processing using waste heat under the aid of catalysts, thereby storing thermal energy in the chemical energy. Meanwhile, the low-temperature waste heat will be converted into power directly through the thermoelectric effect. The produced electricity can be used in the combustion facility. To achieve these goals, the key technologies include: (1) catalyst preparation, (2), the binding of catalyst layer and facility, (3) the production of thermoelectric materials with high efficiency, and (4) the integration of thermoelectric generation and organic Rankine cycle. After this project is finished, the conversion technologies of low-temperature waste heat into fuel and power can be established which is conducive to energy and fuel saving, whereby the resource and environment sustainability can be implemented.