

EST-005

Thermo-fluid engineering in deep geothermal energy

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Recent years in particular in Korea see intensive interests in a deep geothermal engineering and its application in different uses as far as from direct uses to power generation sectors, that are achieved by harnessing hot energy sources from the earth. For instance widespread interest has been generated because the geothermal energy is the source that one extracts it for more than 20 hours per day and for about 30 years of an operation of the plant, which enables to give base load as for heating as well as an electric generation. In retrospect, shallow geothermal energy using heat pumps is commonplace in Korea while the deep geothermal is in the early stage of the development. Geothermal energies in view of the way of extracting heat are mainly categorized into several types such as a single well system, a hydrothermal system, an enhanced geothermal system (EGS) etc. In this talk, this speaker focuses on the thermo-fluid engineering of the single well system by introducing the modeling in order to harness hot fluid that is thermally balanced with the fluid of an injection well, which provides a challenge to assess the life time of the well. To avoid the loss of the temperature in producing the hot fluid, a specialized pipe or a borehole heat exchanger has been designed, and its concept is introduced. On the other hand, a binary system or an organic Rankine cycle, which provides the methodology to convert the heat into an electricity, is briefly introduced. Some experimental results of the binary system which has been constructed in our lab will be presented. Lastly as for the future direction, some comments for the industrialization of the deep geothermal energy in this country will be discussed.

Keywords: deep geothermal, single well, direct use, geothermal power generation, thermo-fluid modeling

EST-006

Li-ion batteries, its applications and research trends

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Growing market of electric vehicles such as hybrid, plug-in hybrid, and bare electric vehicles in the world is accelerating the significance of Li-ion batteries as a renewable green energy. According to such market flow, the developing components such as cathode, anode, electrolyte, and separator, composing the Li-ion batteries, is significantly important tasks for the commercialization. In particular, development of the cathode material having high capacity and stable thermal stability is essential for long-distance electric vehicle in the near future.

Herein we introduce various applications of Li-ion batteries such as portable electronics, electric vehicles, and energy storage system, and also its research trend, in particular on the cathode materials.

Keywords: Li-ion batteries, renewable green energy, various applications, cathode materials