Innovative Hydrogen liquefaction technologies desired in future society

Development of advanced hydrogen liquefaction system by using magnetic refrigeration technology

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Summary :

For the supply chain of hydrogen, liquefaction cost may occupy 1/3 of total supply price, therefore, developing a high efficient hydrogen liquefier is one of the most important technology issues for incoming hydrogen society. Magnetic refrigeration using the magneto-caloric effect has potential to realize liquefaction efficiency higher than 50%, and also to be environmentally friendly and cost effective. A hybrid refrigeration cycle consisting of precooling cycle and magnetic active regenerator cycle has been proposed and estimated to achieve a liquefaction capacity of 100 kg/day with FOM = 0.5. Our new project is committed to develop ① such a high efficient hydrogen liquefier and also, ② compact and energy saving re-condensation refrigerator to realize zero boil-off in the liquid hydrogen storage.