

Introduction of distributed energy networks to residential homes

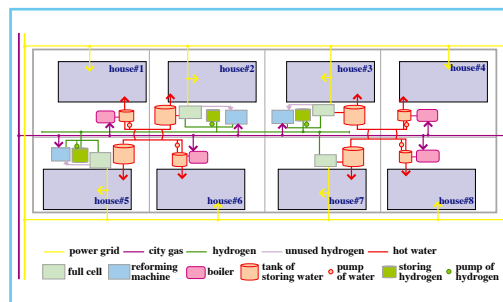
The application of distributed energy network technology to the introduction of fuel cells in residential areas is described. The energy networks of electricity, heat, and hydrogen enable flexible operation of equipment and contribute to CO₂ emission mitigation, energy saving, and cost reduction.

Two concrete systems for a group of detached houses and an apartment building have been designed and proposed. The system for a group of detached houses reduces 6-8 % of CO₂ emission and 50 % of initial costs. The system for an apartment building provides flexibility on the supply of electricity and heat by combining CHP (Combined Heat and Power) systems which have different heat and electricity generation characteristics.

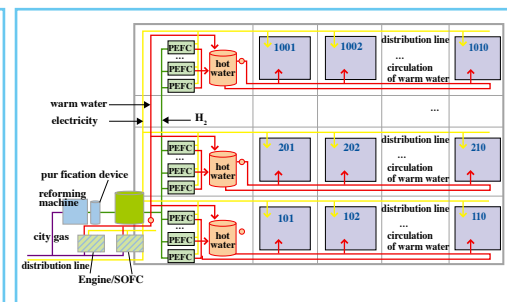
The demonstration in an apartment building has been started to evaluate the effect quantitatively and acquire know-how for practical application.

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Systems for a group of detached houses.

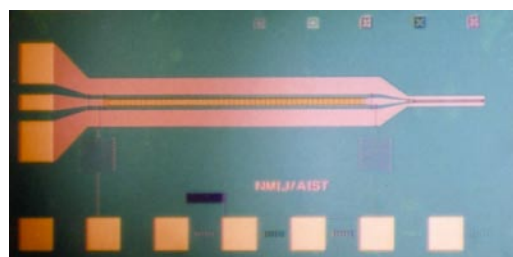


Systems for an apartment building.

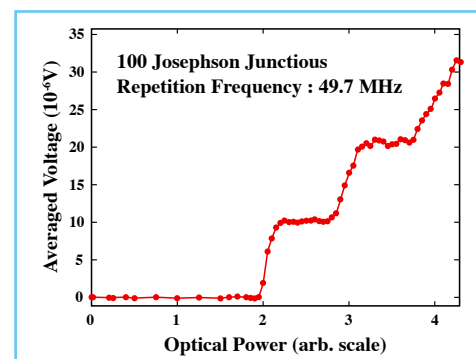
Metrology and Measurement Technology

Development of a pulse-driven Josephson voltage standard

We have been developing a pulse-driven Josephson voltage standard in order to establish a quantized AC voltage standard at AIST. As the first step toward this goal, we have performed an experiment of operating an overdamped Josephson junction array by current pulse trains generated by triggering a photo detector located in a cryostat with an optical comb. Quantized voltage steps have been verified at a multiple of 10 μ V, which agrees with the repetition rate of the pulse laser and the number of Josephson junctions in the array.



Josephson junction array used in the experiment (100 junctions).



Optical power dependence of the output voltage of the Josephson Junction array.

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