

# Project Title: International Joint Research and Development of Lead-Free Alloyed

## Tin Perovskite Tandem Solar Cells (2021–2024)

Entrusted Party: The University of Electro-Communications



### Outline of the project

#### Background of this project

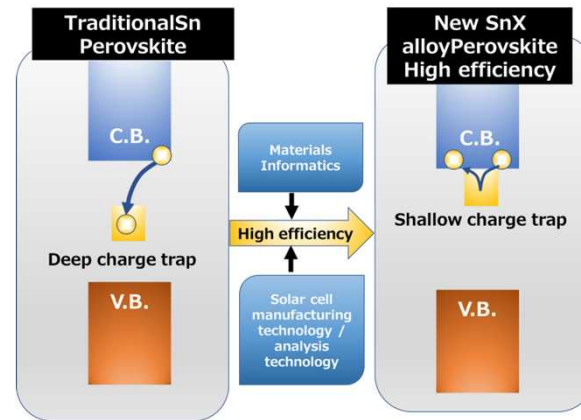
In order to realize a carbon neutral society, it is necessary to further increase the amount of solar power generation introduced by installing solar cells on lightweight roofs and building walls where it is difficult to install conventional silicon PV modules. Therefore, perovskite solar cells, which can be manufactured into lightweight and flexible shapes, are attracting attention, and research on improving conversion efficiency and durability for practical use has been taking place.

#### Purpose of this project

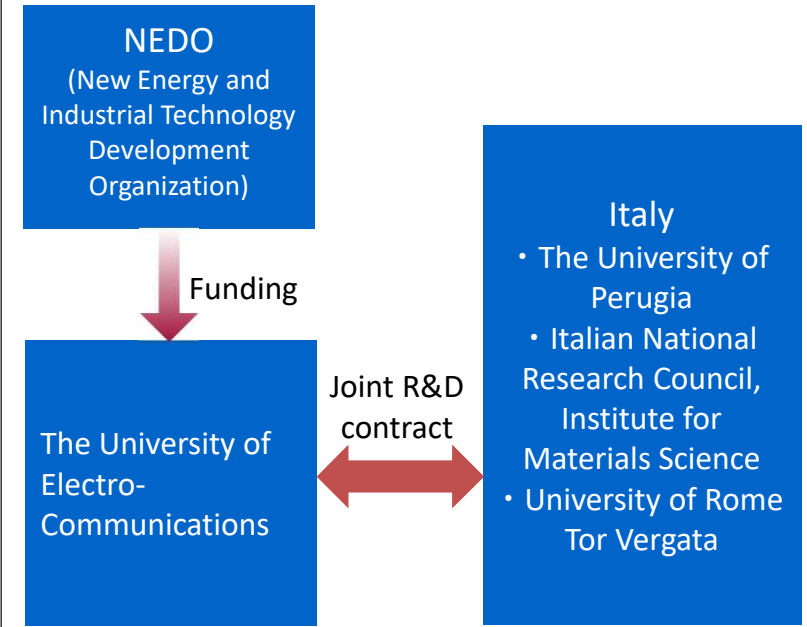
Since conventional perovskite solar cells contain lead, there has been concern about their impact on the environment. Therefore, in this project, we will develop a highly efficient lead-free alloyed tin perovskite solar cell, pursuing practical durability.

#### R&D item

Research institutes in Japan and Italy will collaborate to develop lead-free perovskite materials. Utilizing material informatics, we aim to improve efficiency by narrowing the energy gap from charge trap due to lattice defects and pursue practical durability.



### Project scheme



### Expected outcomes

- Flexible solar cells with the advantages of being lightweight and highly efficient can be newly applied to agricultural land around residential areas, building walls, vehicles, and so on.

- Expected introduction amount of flexible solar cells: 50–100 GW (2050)

- Assumed CO<sub>2</sub> reduction effect:

$6 \times 10^7$  tons-CO<sub>2</sub>/year

\*Calculated as 10% of Japan's electric energy

- Expected economic effects: Market size of 2 trillion yen by installing the flexible solar cells on 0.5% of agricultural land and 10% of wall surfaces in housing and apartment complexes in Japan.

### Significance of international R&D

This project is carried out in collaboration with the Italian computational team, who has attained world-class achievements in the theory and computational science of perovskite materials. As there is no comparative research group in Japan that can cover such a wide range of materials informatics technology, joint research with Italy is indispensable for exploring new materials.