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Impurity dependent semiconductor type of epitaxial CuFeO_2 (111) thin films deposited by using a pulsed laser deposition

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ABSTRACT

We have prepared CuFeO_2 thin films successfully oriented to the (111) direction on amorphous glass substrates by PLD. The average grain size analyzed by SEM images is about 80–90 nm, and CuFeO_2 grains are formed to the hexagonal flat shape which means CuFeO_2 with the rhombohedral structure was hexagonally grown on the amorphous glass substrate. P-type conductivities are commonly governed by impurities of the amount of metallic Cu phase. However, it was found that the highly (111) oriented CuFeO_2 film shows insulation properties and CuFe_2O_4 phase affects the change of the type of semiconductor from p-type to n-type.

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