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液体プロセスによる高品質アルミニウム膜の選択的堆積

Selected Deposition of High-Quality Aluminum Film by Liquid Process

北陸先端大,[1] JST-ERATO 下田ナノ液体プロセス,[2] JSR[3]

申　仲栄,[1,2] 松木　安生,[2,3] 下田　達也[1,2]

Japan Adv. Inst. Sci. & Tech.,[1] JST-ERATO Shimoda Nano Liquid Process Project,[2] JSR[3]

Zhongrong Shen,[1,2] Yasuo Matsuki,[2,3] Tatsuya Shimoda[1,2]

E-mail: z-shen@jaist.ac.jp

Aluminum is commonly used as an electrode material in a variety of applications because of its high conductivity and low cost. Until now, the main processes used to synthesize Al film or pattern have been vacuum deposition techniques (e.g., physical vapor deposition (PVD) and chemical vapor deposition (CVD)). For fine patterning of Al films, an etching process is conventionally used. However, conventional etching can result in physical and chemical damage to the target film surface because the etching needs to be performed in plasma containing reactive free radicals and ions for dry etching, or acidic or alkaline solution for wet etching.

The principle of fabricating devices by a liquid process has sparked intensive research from the viewpoint of reducing processing costs.[1, 2] Herein we report a simple solution process for the selected deposition of an Al pattern.[3] Al is obtained .from the decomposition of alane under dehydrogenation catalysis of a Pt nanocrystalline pattern on a substrate at ~105−120 °C, while the self-decomposition of alane in solution is avoided in the presence of high-boiling-point amine (Figure a). This deposited film generates Al crystals with a diameter of several hundred nanometers, following an epitaxial growth to a continual film. The obtained film shows high conductivity, with a resistivity close to that of bulk Al. Figure b is a sample of the selectivity of Al on substrate measured by optical microscopy. It shows the clear electrode pattern with a width of 20 μm on a Pt nanocrystalline pattern, and the clear surface of the silicon substrate without a Pt nanocrystalline pattern.

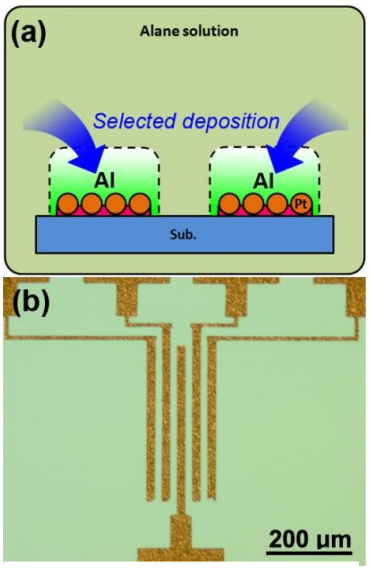

Figure (a) Schematic illustration of selected deposition of Al on a Pt nanocrystal pattern. ***(b)*** Optical microscopy of 20 μm Al electrode pattern.

【参考文献】

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