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Nanomanufacturing — Key Control Characteristics

Part 8-3: Nano-enabled metal-oxide interfacial devices — Analogue resistance change and resistance fluctuation: Electrical resistance measurement

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NANOMANUFACTURING – KEY CONTROL CHARACTERISTICS –

Part 8-3: Nano-enabled metal-oxide interfacial devices – Analogue resistance change and resistance fluctuation: Electrical resistance measurement

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INTRODUCTION

Nano-enabled metal-oxide interfaces, such as an oxide nanolayer sandwiched by metal electrodes, are the essential components of IoT devices for computing. Nano-enabled functions derived from the nanoscale metal-oxide interface and the oxide nanolayer appear, such as a significant change in electrical resistance. The analogue resistance change is the typical characteristic which possesses the large potential for non-von Neumann information processing. More concretely, the metal-oxide interfacial device is an indispensable element in the product-sum circuit that records the learning process as the analogue resistance change. In the research community, however, the analogue change and the fluctuation of the resistance have not yet been systematically investigated. The reason why systematic research and development is not progressing is that the measurement protocol of these characteristics is not quantitative. The bottleneck impedes not only the electrotechnical evaluation of the device but also developments for various applications.

This document offers a measurement protocol of the analogue resistance change and the quantitative index to evaluate the linearity of the analogue resistance change in nano-enabled metal-oxide interfacial devices.

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