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APL Materials
5, 042303 (2017).
Published online: 27 January 2017
DOI: 10.1063/1.4974484

強相関電子系酸化物を用いたナノ電気化学トランジスタ

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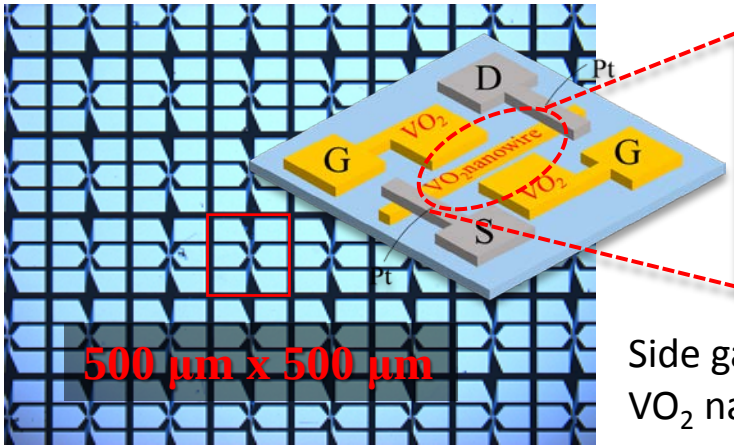
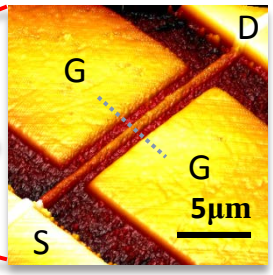
Research Update: Nanoscale electrochemical transistors in correlated oxides

Teruo Kanki, Hidekazu Tanaka

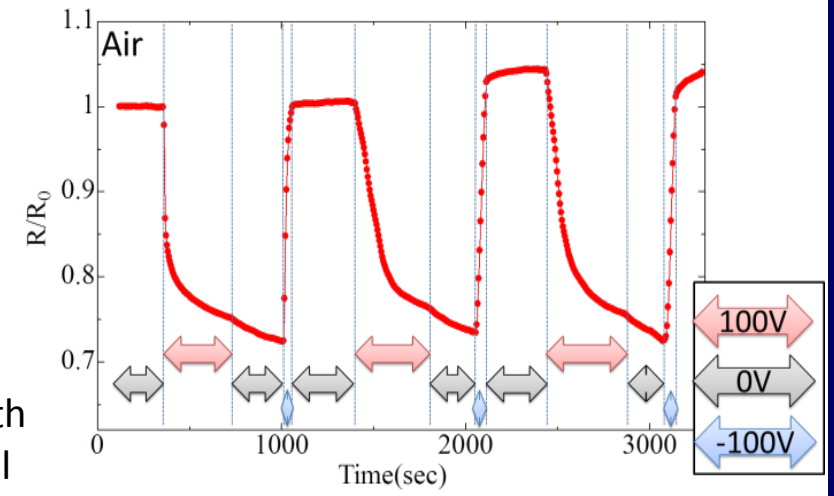
Optical microscope image of devices



AFM image



Side gate type FET with VO_2 nanowire channel



湿度制御された環境下で、ナノエアーギャップを有するサイドゲート型VO_2ナノワイヤーチャネルトランジスタにおいて、吸着水を利用した電気化学酸化還元法による水素イオンの可逆脱・挿入により電気伝導性制御に成功した。

In this research, dramatic transport changes in vanadium dioxide (VO_2) nanowires were demonstrated by electric field-induced hydrogenation at room temperature through the nanogaps separated by humid air in a field-effect transistor structure with planar-type gates. Our results will contribute to further strategic researches to examine fundamental chemical and physical properties of devices and develop iontronic applications.