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Top contact approach to the nanoscale organic electronic systems using novel stencil lithography technique[1] HOYEOL YUN, HAKSEONG KIM, SANG WOOK LEE, Division of Quantum Phases & Devices, School of Physics, Konkuk University, Seoul, Korea, SANGWOOK KIM, SEUNGMOON PYO, Department of Chemistry, Konkuk University, Seoul, Korea, JUN SUNG KIM, Department of Physics, Pohang University of Science and Technology, Seoul, Korea — In this presentation, we proposed a widely adaptable fabrication method to form a nanoscale organic electronic system with top contact electrodes using a Poly(methyl methacrylate) (PMMA) shadow mask which has a transparency, flexibility and high resolution electrode pattern. The stencil lithography technique with the PMMA mask was developed by the combination of the standard electron beam lithography and the micro transfer printing technique. Firstly, this technique was applied to fabricate nanoscale pentacene field effect transistor (FET) which has top contact source and drain electrodes. The configurations of pentacene layer such as position, width and length were controlled by a PMMA shadow mask which was pre-transferred onto a target substrate. Another PMMA shadow mask with electrode pattern was precisely aligned on the pre-deposited pentacene layer and the pairs of gold electrode were defined after the thermal evaporation followed by mechanical detachment of the mask. The channel length of the transistor was varied from 5um to 500nm and placed at regular intervals along the pentacene layer. The electrical performance of the pentacene FET was statistically analyzed according to the channel length variation.

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