Supporting Information

Nonvolatile Organic Floating-Gate Memory Using N2200 as Charge-Trapping Layer

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Device fabrication process:

The device was fabricated on a heavily doped silicon wafer, which served as the gate electrode of the device and on which 90 nm thick SiO_2 was thermally grown[1]. The substrates were cleaned in an ultrasonic bath of acetone, ethanol, and deionized water for 5 min, rinsed in deionized water, and dried in an oven at 100 °C. After standard cleaning, N2200 films were coated onto SiO_2/Si(p+) substrates by a spin-coating technique using a toluene solution of N2200[2,3] (4 mg mL^{-1}) at 3000 rpm for 60 s. PMMA[4,5] (2 mg mL^{-1}) was coated as a tunneling layer on the N2200-covered SiO_2/Si(p^+) substrate using the spin-coating technique at 3000 rpm for 60 s. Then, on top of the polymer film (PMMA), a 40 nm thin film of para phenylene was deposited on the surface of the PMMA using the thermal evaporation technique. The source and drain of 50 nm were thermally evaporated on the parallel pentacene[6] film with channel lengths and widths of 80 μm and 1000 μm, respectively. The device fabrication process is shown in Figure S1. For the measurement of each functional layer, ellipsometry can be used for thickness measurements, such as the N2200 charge-trapping layer and the PMMA tunneling layer. Ellipsometry uses optical principles to accurately calculate the thickness of a film by measuring the change in the polarisation state of polarised light after reflection on the film surface. The sample is placed on the sample stage of the ellipsometer and the instrument parameters are adjusted so that the light beam hits the sample surface at a specific angle. By analyzing the polarization characteristics of the reflected light and combining them with known optical constants of the material and the film structure model, the ellipsometer software is able to quickly and accurately calculate the thickness of the film.

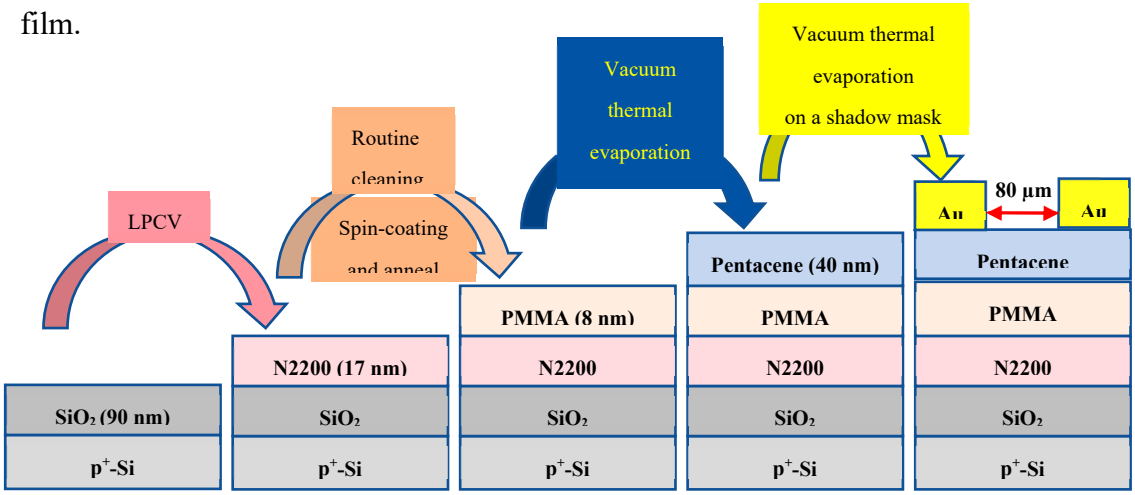

Figure S1. Device fabrication process

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