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Growth and Characterization of Serrated GaN Nanowires

ZHENG MA, DILLON MCDOWELL, MOHAMED ABD ELMOULA, EUGEN PANAITESCU, DALMAU REIG, LATIKA MENON, Northeastern University — We describe our results on the growth of single crystalline GaN nanowires on catalyst-patterned substrates by means of chemical vapor deposition. The growth is carried out in a horizontal quartz tube inside a tube furnace wherein gallium oxide powder is used as reactor source and a mixture of ammonia and hydrogen gas is used as precursor. Growth of GaN nanowires are demonstrated on both Au and Ni-catalyst patterned substrates (either sapphire or silicon). The growth temperature is maintained at around 960 °C. We show that by controlling the deposition parameters, specifically the size of the catalyst and amount of gallium oxide GaN nanowires grow in a “serrated” pattern. The serrated nanowires maintain a stable, single crystalline state with very regular periodic serrations. The wires have been characterized by means of scanning electron microscopy, transmission electron microscopy and energy dispersive x-ray scattering measurements. Preliminary electrical transport measurements on single serrated GaN nanowires released onto a Si substrate show that the wires exhibit improved electron transport capabilities in comparison with regular GaN nanowires.

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