

## Supporting Information

### P-type 3C-SiC nanowires and optical and electrical transport properties

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#### Experimental Section:

Commercially available polysilazane (Ceraset, Kion, USA) was used as the raw material. The as-prepared Al-doped 3C-SiC NWs were grown by the following means. First, the polysilazane was solidified by heat-treatment at 260 °C for 30 min and then this was ground into a powder. Then, 0.4 wt% Al<sub>4</sub>C<sub>3</sub> was introduced as the additive into the powders, which were further ground, tailoring the doping level. The synthesis of three samples with different intentional Al doping concentrations at 2, 3.3 and 4.5 wt% has been tried and eventually realized by adding 0.4, 0.7 and 1 wt% Al<sub>4</sub>C<sub>3</sub> to the fine powder, respectively<sup>1</sup>. The obtained powder mixture was pyrolyzed at 1550 °C for 20 min in a conventional furnace with a graphite resistance heater under ultra-high purity Ar (99.99%) of 0.1 MPa at a flow rate of 200 sccm, followed by furnace cooling to ambient temperature. A graphite sheet with a thickness of ~ 1 mm was utilized as the substrate and located on the top of the alumina crucible.

#### Notes and references

1 F. Gao, W. Yang, H. Wang, Y. Fan, Z. Xie and L. An, *Cryst. Growth Des.*, 2008, **8**, 1461.