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Solution-processable SWNT transistors: Toward high performance and full semiconducting device yield WENJING ZHANG, CHUN WEI LEE, JIANWEN ZHAO, LAIN-JONG LI, Nanyang Technological University — The major hurdle to scale up SWNT network field-effect transistors (FETs) is the difficulty in obtaining high mobility and full semiconductor device yield due to the co-existence of metallic and semiconducting tubes in fabricated networks. We demonstrate that the radical initiator 1,1'-azobis(cyanocyclohexane) (ACN) allows for release of radicals which preferentially react with small and metallic SWNTs. By applying this reaction to CoMoCat SWNTs, metallic tubes are electrically suppressed and semiconducting thin-film transistors can be readily made with almost full semiconductor device yield. The effective mobility can be raised to ∼10 cm2/V·s with increasing the network thickness to ∼20 nm while keeping the on-off ratio higher than 10000. Moreover, top-gated devices with polymer-ionic liquid mixture as the dielectrics are demonstrated to be almost hysteresis-free and with low threshold voltage, promising applications in low-cost printable electronics.

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