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Mayne-L'Hermitte

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Abstract NT19

Growth of vertically aligned carbon nanotubes on aluminium substrate at low temperature through a one-step thermal CVD process

A. Combrisson¹, F. Nassoy², M. Pinault¹, C. Reynaud¹, E. Charon¹, M. Mayne L'Hermite¹

¹NIMBE, CEA, CNRS, Université Paris-Saclay, CEA Saclay 91191 Gif sur Yvette, FRANCE

²NAWATechnologies, 190, Avenue Célestin Coq, 13106 Rousset, FRANCE

This study addresses the vertically aligned carbon nanotubes (VACNT) growth on specific substrates by thermal aerosol assisted CCVD at low temperature (LT). This one-step continuous process is based on the simultaneous injection of catalytic and carbon precursors into a reactor to form in-situ catalytic particles leading to the VACNT growth. It has initially been developed at high temperature (800-850 °C) [Pinault et al 2005, Castro et al 2013] and is easily scalable. Recently it has been adapted to grow VACNT on Al foils to fabricate ultracapacitor electrodes, requesting a lower process temperature [Nassoy thesis 2018].

According to our previous work, hydrogen adjunction in the gas phase promotes the catalyst precursor decomposition at LT. Using acetylene as a carbon precursor is more favorable for decomposition at LT. Recent results enabled to obtain clean, long and dense VACNT at LT with growth rates at the best level of state of the art for multi-step assisted CVD. However, a decrease in growth rate and a catalytic particle poisoning are observed for long time synthesis, inducing a carpet height limitation.

The main goal is to strengthen our understanding of VACNT growth at LT and to identify mechanisms involved, in order to have a better control of the growth process.