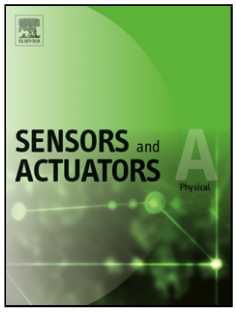

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Piezoresistive response of carbon nanotube composite film under laterally compressive strain

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Highlights

- This study explored the piezoresistive behavior of high CNT-loading carbon nanotube composite film to advance the self-sensing ability of structural composite.
- The relationship between microstructure and piezoresistive response for typical carbonaceous film material was revealed by comparing CNT and graphite composite films.
- The piezoresistive behavior of CNT composite film was effectively tailored by polymeric matrix and CNT functionalization.

Abstract：

Carbon nanotubes (CNTs) have attracted great attention for strain sensor application due to their excellent electromechanical property. This paper focused on the piezoresistive response of high CNT loading composite film. The piezoresistive behavior of floating catalyst chemical vapor deposition (FCCVD)-grown CNT composite film under tension and lateral compression was investigated and compared with a graphite composite film. The effects of matrix type, sidewall epoxidation and acid treatment on piezoresistive response of CNT composite film were discussed. The results showed that CNT composite film exhibited positive piezoresistive response under tension and negative piezoresistive effect under lateral compression. After eliminating the effect of geometrical deformation on gauge factor, the change in resistivity was more sensitive under lateral compression than under tension. Different from CNT composite film, graphite composite film showed less obvious piezoresistive behavior, and showed positive piezoresistive response regardless of tensile and laterally compressive loads. Furthermore, the piezoresistive response of CNT composite film was found to closely