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Effective lubricant additive of nano-Ag/MWCNTs nanocomposite produced by supercritical CO_2 synthesis

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Abstract:

Silver nanoparticles dotted on the external walls of multi-walled carbon nanotubes (MWCNTs) were prepared by an aldehyde reduction process in supercritical carbon dioxide ($scCO_2$) fluid. The silver nanoparticles with narrow size distribution of 5-15 nm are uniformly anchored on MWCNT walls. The prepared nanocomposite of nano-Ag/MWCNTs was used as lubricant additive in 10w40 engine oil and its lubricating performances was evaluated by a four-ball tribometer. The friction coefficient and wear scar diameter were reduced by 36.4% and 32.4% respectively, when the engine oil was dispersed with 0.18 wt. % nanocomposite. After synthetically analyzing worn surface by means of scanning electron microscopy and X-ray photoelectron spectroscopy, the lubrication mechanism of this nanocomposite as oil additive is discussed and postulated.

Keywords: nano-Ag/MWCNTs nanocomposite; $scCO_2$ synthesis; lubricant additive;

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