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低温等离子体协同纳米催化技术降低柴油机NOx排放

NOx conversion of diesel engine with non-thermal plasma assisted nano-catalyst

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英文关键词:diesel engine exhaust gases experiments non-thermal plasma bench test nano-catalyst

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中文摘要:

针对目前国内外开展的利用低温等离子体协同催化（NPAC）技术转化NOx排放的热点科学问题，采用柠檬酸络合法制备了一种La0.8K0.2Mn0.5Co0.5O3（LKMCO）纳米催化剂，协同低温等离子体（non-thermal plasma，NTP）发生器建立了NPAC系统。通过发动机台架试验，研究了NPAC技术转化柴油机NOx排放的影响因素，重点分析了NTP能量密度和排气温度对转化NOx的影响规律。结果表明：在NTP不同放电频率工作下，O2浓度与原机相比明显降低，降幅最高为5.17%；随着能量密度的增加，NO2浓度升高，NO浓度降低。在放电频率为14.0 kHz条件下，当能量密度大于80J/L时，NO2和NO浓度开始转化；在温度为280～350℃时，LKCMO催化剂发挥活性，NPAC技术作用下NOx转化效率得以显著提高。

英文摘要:

A non-thermal plasma assisted catalyst (NPAC) reactor was designed, and La0.8K0.2Mn0.5Co0.5O3 nano- catalyst was prepared by the means of citrate-gel method. The bench test was carried out to investigate the effects of NTP special energy density and temperature on NOx reduction with NPAC system. Results showed that the concentration of O2 was reduced significantly compared with the reference test under different frequencies of NTP discharge, and the maximum reduction was to 5.17%. The concentration of NO2 was increased and the concentration of NO was reduced with the increase of NTP specific energy density. NO2 and NO began to transform when the specific energy density exceeded 80J/L under the frequency of 14.0 kHz. The catalytic activity of La0.8K0.2Mn0.5Co0.5O3 catalyst began to appear in the temperature range of 280-350℃, and the concentration of NOx was reduced effectively under the treatment of NPAC system.

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