陈朝辉,张韦,陈贵升,沈颖刚.排气温度和催化基质特性对柴油机排放的影响[J].农业工程学报,2014,30(9):42-49

排气温度和催化基质特性对柴油机排放的影响

Influence of exhaust temperature and catalytic substrate properties on diesel exhaust

投稿时间： 2013-10-09 最后修改时间： 2014-04-02

中文关键词：柴油机 催化器 温度 排放 基底特性 氮氧化物 碳烟

英文关键词：diesel catalytic temperature exhaust substrate property NOx soot

基金项目：National Natural Science Foundation of China (No.51276128), Yunnan Provincial Science and Technology Department(2013FB017), Yunnan Provincial Department of Education (KKJA201256011), Kunming University of Science and Technology (KKSY201256142).

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中文摘要：

为了提高催化器CDPF（catalyzed diesel particulate filter）去除NOx和PM的性能，该文运用催化试验、发动机台架试验及模拟计算，研究了排气温度和催化器的基底材特性对NOx还原和PM氧化的影响特性。通过活性评价和表征试验发现，由于La2Cu0.7Fe0.3O4表面具有较高的氧空位浓度和较强的晶格氧移动特性，所以300°C~500°C有较好的催化活性，且350°C~500°C时碳化硅较堇青石能更好地催化还原NO。发动机台架试验表明，由于碳化硅具有更高的孔隙率和更好的热交换特性，在1 600 r/m5%和90%负荷工况时，碳化硅CDPF具有更好地催化去除NOx和PM的特性规律。模拟计算结果显示，具有较高过滤孔密度和比表面积的CDPF，由于较低的内部传质阻力较高的传质特性，所以能较好地还原NOx和氧化PM。研究结果可为优化柴油机后处理器CDPF的催化性能提供科学依据。

英文摘要：

Abstract: The influence of different temperatures and CDPF (catalyzed diesel particulate filter) substrate properties on NOx reduction and PM oxidation were studied by catalyt experiments, engine bench tests and simulation. From activity evaluation and characterization tests, it was found that owing to the higher mobility of lattice oxygen and the maximu concentrations of oxygen vacancies, La2Cu0.7Fe0.3O4 showed a relatively better catalytic performance between 300° C to 500° C. The NO conversion efficiency on SiC (Silicon carbide) substrate was better than that on cordierite substrate from 350℃ to 500℃ under simulated diesel emission conditions. The engine bench test results showed that NOx conversion efficiency increased from 340℃ to 528℃. Due to higher porosity and stronger thermal diffusion characteristics, the soot oxidation rate and NOx conversion rate on SiC substrate CDPF is better than that on cordierite substrate, under condition of 75% and 90% loads of engine at 1 600 r/min. From simulation researches, CDPF with higher cell dens and specific surface-area cell resulted in lower internal mass-transfer resistances, and higher mass-transfer coefficients, which yielded better soot and NOx reduction performances

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