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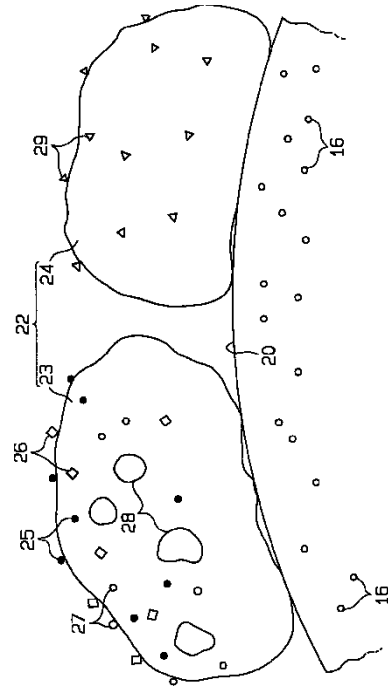
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(54) Title of Invention  
A Catalyst for Exhaust Gas Purification

(57) Abstract (Revised)  
[Problem] To provide an easily manufactured catalyst for exhaust gas purification that removes hydrocarbons contained in exhaust gas, carbon monoxide and nitrogen oxide black sooty particulate.  
[Resolution Means] A catalyst for exhaust gas purification wherein a ceramic carrier is configured by ceramic particles 20 composed of zirconium phosphate, and the ceramic particles constituting a ceramic carrier is made to function as a catalyst for gas purification. At least a portion of the cations contain an alkali metal or alkaline earth metal catalyst 16. Also, a catalyst coating layer 22 is carried in the ceramic particles 20. This is composed of alumina particles 23 by ceramic oxide and zirconia particles 24. Also, other metal catalysts and the like are used in combination.



## Scope of Claims

What is claimed is:

[Claim 1] A catalyst for exhaust gas purification that removes hydrocarbons contained in exhaust gas, carbon monoxide and nitrogen oxide black sooty particulate, comprising a catalyst for exhaust gas purification, wherein at least a portion of cations of ceramic particles constituting a ceramic carrier composed of zirconium phosphate is substituted with an alkali metal or an alkaline earth metal.

[Claim 2] A catalyst for exhaust gas purification that removes hydrocarbons contained in exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulate, comprising a catalyst for exhaust gas purification, wherein an alkali metal or alkaline earth metal catalyst is contained in ceramic particles constituting a ceramic carrier composed of zirconium phosphate.

[Claim 3] The catalyst for exhaust gas purification according to claim 1 or 2, wherein the ceramic carrier is composed of NZP having a three-dimensional network structure.

[Claim 4] The catalyst for exhaust gas purification according to any one of claims 1 to 3, wherein a catalyst coating layer, which is composed of ceramic oxide particles that carry a precious metals catalyst, is carried in the ceramic particles.

[Claim 5] The catalyst for exhaust gas purification according to any one of claims 1 to 4, wherein a catalyst coating layer, which is composed of particles of a ceramic oxide that carries an alkali metal or alkaline earth metal catalyst, is carried in the ceramic particles.

[Claim 6] The catalyst for exhaust gas purification according to claim 5, wherein an alkali metal and alkaline earth metal catalyst constituting the catalyst coating layer, contains at least one element selected from lithium, sodium, potassium, and barium.

[Claim 7] The catalyst for exhaust gas purification according to any one of claims 4 to 6, wherein a ceramic oxide constituting the catalyst coating layer, contains at least one element selected from alumina, zirconia, titania and silica.

[Claim 8] The catalyst for exhaust gas purification according to any one of claims 5 to 7, wherein a catalyst constituting a catalyst contained in the ceramic particles and the catalyst coating layer are the same material.

[Claim 9] The catalyst for exhaust gas purification according to any one of claims 4 to 8, wherein a rare earth metal co-catalyst is carried in ceramic oxide particles of the catalyst coating layer.

[Claim 10] The catalyst for exhaust gas purification according to claim 9, wherein the co-catalyst contains at least one simple substance or compound selected from cerium or lanthanum.

[Claim 11] The catalyst for exhaust gas purification according to any one of claims 1 to 10, wherein the ceramic carrier is a honeycomb structure having of a plurality of through holes divided by cell walls.

[Claim 12] The catalyst for exhaust gas purification according to claim 11, wherein both ends of the ceramic carrier are alternately sealed in a checkered pattern by a sealing body.

[Claim 13] A catalyst for exhaust gas purification for removing hydrocarbons contained in exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulate comprising: ceramic particles that are substituted by an alkali metal or alkaline earth metal, and constitute a ceramic carrier of a honeycomb structure composed of zirconium, and a catalyst coating layer carried by the ceramic particles, and contains alumina particles that carry an alkali metal catalyst, an alkaline earth metal catalyst, a previous metal catalyst and a rare earth metal co-catalyst.

[Detailed Description of the Invention]

[0001]

[Field] The present invention relates to a catalyst for exhaust gas purification that removes hydrocarbons contained in an exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulates.

[0002]

[Related Art] Conventionally, as a catalyst for exhaust gas purification of this type, for example, a catalyst carrying filter 100 for purifying exhaust gas of a diesel engine is known. As illustrated in Fig. 4, the catalyst carrying filter 100 is connected to the exhaust side of a diesel engine, each cell 101 that becomes an exhaust gas passageway is formed in a honeycomb shape, and the cells 101 are alternately sealed. Then, the catalyst carrying filter 100 collects particulates (PM: black sooty particulate) deposited in the interior, and purifies exhaust gas through oxidation of PM, HC and CO, and by reducing NO<sub>x</sub>.

[0003] For formation materials of the catalyst carrying filter 100, there are porous silicon carbide sintered bodies having excellent heat resistance and thermal conductivity. Then, as shown in Fig. 5, an alumina coating layer (catalyst coating layer) 103 is formed on the surface of the silicon carbide particles constituting a ceramic carrier 102. The alumina coating layer 103 is formed by drying and firing after the slurry containing the alumina particles is impregnated in the ceramic carrier 102. Further, in the alumina coating layer, a catalyst 104 composed of precious metals of Pt, Pd, Rh, and the like is carried. The catalyst 104 is carried in the alumina coating layer 103 through drying and firing after a palladium nitrate aqueous solution and the like is impregnated in an alumina coated ceramic carrier 102.

[0004]

[Problem to be Solved by the Invention] However, in the conventional catalyst for exhaust gas purification, in order to function as a catalyst in the ceramic carrier 102, the precious metal catalyst 104 must be carried in the silicon carbide particle 105. Therefore, it takes time for a catalyst to be carried and the manufacturing efficiency is decreasing and the cost is increasing.

[0005] The present invention was made in view of the above-mentioned problems and the purpose is to occlude more NO<sub>x</sub> even without specially carrying the catalyst in a ceramic carrier, rather than when being carried by having a NO<sub>x</sub> occlusion component in the carrier itself. In other words, it offers a catalyst for exhaust gas purification that can have the function of a catalyst for exhaust gas purification in the ceramic particles themselves constituting the ceramic carrier.

[0006]

[Means for Solving the Problem] To solve the problems above, with the invention according to claim 1, the catalyst for exhaust gas purification that removes hydrocarbons contained in the exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulates is characterized in that at least a portion of the cations of the ceramic particles constituting the ceramic carrier composed of zirconium phosphate is substituted with an alkali metal or alkaline earth metal.

[0007] With the invention according to claim 2, the catalyst for exhaust gas purification that removes hydrocarbons contained in the exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulates is characterized by including an alkali metal or an alkaline earth metal catalyst in the ceramic particles constituting the ceramic carrier composed of the zirconium phosphate.

[0008] With the invention according to claim 3, the catalyst for exhaust gas purification according to claim 1 or 2 is characterized in that the ceramic carrier is composed of NZP having a three-dimensional network structure.

[0009] With the invention according to claim 4, the catalyst for exhaust gas purification according to any one of the claims 1 to 3 is characterized in that a catalyst coating layer, which is composed

of particles of ceramic oxide for carrying a catalyst of precious metals and the like, is carried in the ceramic particles.

[0010] With the invention according to claim 5, the catalyst for exhaust gas purification according to any one of the claims 1 to 4, is characterized in that a catalyst coating layer, which is composed of particles of ceramic oxide for carrying a catalyst alkali metals or alkaline earth metals, is carried in the ceramic particles.

[0011] With the invention according to claim 6, the catalyst for exhaust gas purification according to claim 5, is characterized in that a catalyst of alkali metal and alkaline earth metal constituting the catalyst coating layer contains at least one element selected from lithium, sodium, potassium, and barium.

[0012] With the invention according to claim 7, the catalyst for exhaust gas purification according to any one of the claims 4 to 6 is characterized in that a ceramic oxide constituting the catalyst coating layer contains at least one element selected from alumina, zirconia, titania and silica.

[0013] With the invention according to claim 8, the catalyst for exhaust gas purification according to any one of claims 5 to 7 is characterized in that a catalyst constituting a catalyst contained in the ceramic particles and the catalyst containing layer are composed of the same material.

[0014] With the invention according to claim 9, the catalyst for exhaust gas purification according to any one of claims 4 to 8, is characterized in that a rare earth metal co-catalyst and the like is carried in particles of ceramic oxide of the catalyst coating layer.

[0015] With the invention according to claim 10, the catalyst for exhaust gas purification according to claim 9 is characterized in that the co-catalyst contains at least one simple substance of compound selected from cerium and lanthanum.

[0016] With the invention according to claim 11, the catalyst for exhaust gas purification according to any one of claims 1 to 10 is characterized in that the ceramic carrier is a honeycomb structure having a plurality of through holes divided by cell walls.

[0017] With the invention according to claim 12, the catalyst for exhaust gas purification according to claim 11 is characterized in that the ceramic carrier is alternately sealed at both ends in a checkered pattern by a sealing body.

[0018] With the invention according to claim 13, the catalyst for exhaust gas purification for removing hydrocarbons contained in the exhaust gas, carbon monoxide, and nitrogen oxide black sooty particulates, is characterized by composing a ceramic carrier of a honeycomb structure composed of zirconium phosphate, and containing a ceramic particle substituted by an alkali metal or alkaline earth metal, and a catalyst coating layer carried in the ceramic particle, including an alumina particle for carrying an alkali metal based catalyst, an alkaline earth metal based catalyst, a precious metal based catalyst, and a rare earth metal based co-catalyst.

[0019] The “action” of the present invention is described below. According to the invention of claim 1, at least a portion of the cations of ceramic particles constituting a ceramic carrier composed of zirconium phosphate is substituted with an alkali metal or an alkaline earth metal. Therefore, even without specially carrying the catalyst in a ceramic carrier, it is able to function as a catalyst for exhaust gas purification in the ceramic particles themselves constituting the ceramic carrier.

[0020] According to the invention of claim 2, an alkali metal or alkaline earth metal catalyst is contained in ceramic particles constituting a ceramic carrier composed of zirconium phosphate. Therefore, even without specially carrying the catalyst in a ceramic carrier, it is able to function as

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