# Fuel additive composition based on a dispersion of iron particles and on a detergent

The present invention relates to the association of an organic dispersion of iron particles and of a detergent within a composition notably useful as a fuel additive for internal combustion engines.

## SUMMARY

In a first aspect, there is provided a fuel additive composition comprising a dispersion and a detergent comprising a quaternary ammonia salt, said dispersion comprising:

- an organic phase;
- at least one amphiphilic agent, and
- solid objects dispersed in the organic phase, in the form of individualized particles or particle aggregates, consisting of an iron compound in crystallized form, such that said particles have an average size $\overline{D}_{XRD}$ of less than or equal to 12 nm as measured by X-ray diffraction.

In a second aspect, there is provided the use of a composition as defined herein, as a fuel additive for internal combustion engines, notably for assisting with regeneration of the PF.

In a third aspect, there is provided a method for preparing a composition as defined herein, comprising a step for putting into contact and mixing a detergent comprising a quaternary ammonium salt and a dispersion defined herein, whereby said composition is obtained.

In a fourth aspect, there is provided an additived fuel comprising a fuel and a composition as defined herein.

In a fifth aspect, there is provided a method for applying an internal combustion engine comprising a step for delivering to said engine a fuel and a composition as defined herein.

## DETAILED DESCRIPTION

During combustion of fuel and notably of gas oil in an engine, the carbonaceous products tend to form carbonaceous particles, which will be designated in the following of the description under the expression of "soots", which are said to be noxious both for the environment and for health. For a long time, there has been a search for techniques with which the emission of these soots may be reduced.

A satisfactory solution consists of introducing into the exhaust line a particle filter (or PF in the following of the text) which will block soots in its channels in order to let a gas escape without any soots. When a certain amount of accumulated soots in the PF is attained, the soots are burned in order to free the channels of the PF. This step for regenerating the PF is usually accomplished at greater temperatures than the temperature of the gas during normal operation of the engine, the soots usually burning in air at temperatures above 650°C.

In order to assist with regeneration of the PF, a catalyst is generally used which has the purpose of facilitating oxidation of the soots either directly or indirectly. By facilitating the oxidation of the soots is meant the fact of allowing their oxidation at a lower temperature so that this temperature is attained more frequently during normal operation of the engine. A portion of the soots may thus be continuously burned during the operation of the engine.

The catalyst also gives the possibility of lowering the temperature required for regenerating the PF so that the regeneration temperature is less than the combustion temperature of the soots without the presence of said catalyst. The catalyst also allows acceleration of the oxidation rate of the soots which allows a reduction in the required time for regenerating the PF.

The use of an additive for assisting with regeneration of the PF, vectorized by the fuel feeding the engine or further a fuel borne catalyst (FBC), proved to meet many criteria since it allows regeneration of the PF more rapidly and at a lower temperature than the competing technology called catalyzed soot filter (CSF, the catalyst being immobilized in