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# GROWTH MECHANISMS AND ENVIRONMENTAL EFFECTS OF METAL OXIDE AEROSOLS EMITTED FROM AIRCRAFTS AND SHIPS

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Our patent suggests to cut down the atmospheric greenhouse gases CO2 and CH4 by additional emissions of ultrafine particulate matter: Iron oxides and titanium dioxide from the use of a special fuel, enriched with metalorganic compounds, in aircraft and ship engines over the oceans.These rather pure metal oxide particles are of much lower size than natural loess and desert dust contributions to the aerosol load. The iron oxide may cause plancton blooms by iron fertilization to bind atmospheric CO2 and enrich the oceanic sediment with organic carbon, and both metal oxides may act as photocatalysts and increase the tropospheric hydroxyl radical and other efficient oxidants to oxidize CH4.

The metal oxides are emitted as ultrafine particulate matter. It is known that this kind of particles may pose hazards to man when air parcels containing these particles are transported over urban areas. However, soon after emission the ultrafine aerosol mode will be transformed by aging processes to less toxic size ranges.

The properties of iron oxide particles enable them to absorb visible and ultraviolet light, to adsorb and react with gases, liquids and solids like dimethylsulfide, water, seasalt, ozone and oxygen producing the iron(III) salts. Furthermore, it is known that irrradiation of ionic iron compounds may produce oxidants like chlorine and hydroxyl radicals. We propose the rapid growth of primary iron oxide particles by enrichment with hygroscopic matter like iron(III)salts of chloride, sulfate, nitrate, and water.

Photocatalytic properties of unaged TiO2 particles enable them to oxidize adsorbed compounds including CH4 and to produce hydroxyl radicals in sunlight. This activity of TiO2 may be enhanced by iron doting.