burned at the temperatures existing in a stove operating under damped conditions. These temperatures are typically in the range 200 to 400°C. The use of platinum group metal catalysts supported on ceramic honeycomb substrates is now a well established method of controlling emissions of unburned hydrocarbons and carbon monoxide from motor vehicle exhausts. The catalyst reduces the combustion temperature of the hydrocarbons and carbon monoxide so that they start oxidising at temperatures around 250°C. The catalytic reaction increases until the system reaches an equilibrium between the inlet gas temperature, the gas-flow rate and the amount of combustible material in the gas stream. The equilibrium temperature can be as high as about 800°C for an optimum sized catalyst system and at this temperature essentially complete oxidation of the combustibles in the gas stream proceeds very rapidly.

During the course of the past few years the application of catalytic oxidation to promote secondary combustion has led to the appearance on the market of a new generation of wood-burning stoves. One such product has recently been launched by Trolla Brug, a long established Norwegian company. Appropriately named the Pioneer, it combines the traditional appeal of a cast iron stove with the modern technology of catalytic secondary combustion.

The stove is a three-tier design comprising a primary combustion chamber, a secondary combustion chamber incorporating the catalyst and a third storey which acts solely as a heat exchanger. The catalyst, which was specifically developed by Johnson Matthey Chemicals Limited for wood-burning stove applications comprises platinum metal dispersed on a low cell density ceramic honeycomb support. The multi-storey design provides a large surface area for maximum heat exchange efficiency. The incorporation of the catalytic afterburner is claimed to result in a 30 per cent reduction in wood consumption for the same useful heat output compared to the non-catalytic version of the same stove. In addition smoke emission levels are greatly reduced and the potentially dangerous accumulation of inflammable condensates in the chimney avoided. A.E.R.B.

Osmium Doping Improves Recording Media

THIN FILMS HAVE HIGH COERCIVITY AND COERCIVE SQUARENESS

In magnetic recording the continuing demand for ever increasing recording density has stimulated research on thin films of continuous magnetic materials suitable for the production of high capacity storage discs. Sputtered γ-Fe_2O_3 thin films are attractive for this application in view of their high coercivity and high remanent magnetisation, combined with their resistance to corrosion and wear, and a γ-Fe_2O_3 film containing small amounts of cobalt, copper and titanium has been developed. The function of these additions is to increase the coercivity of the film, to improve coercive squareness, to widen and lower the temperature range of the α-Fe_2O_3 to Fe_3O_4 reduction—so making it possible to obtain uniform magnetic properties—and also to suppress grain growth during heat-treatment.

Now workers at the Ibaraki Electrical Communication Laboratory in Japan report that remarkable improvements have been made to the magnetic properties and microstructure of sputtered γ-Fe_2O_3 thin films when osmium is used as an additive element (O. Ishii and I. Hatakeyama, *J. Appl. Phys.*, 1984, **55**, (6), 2269–2271).

Films 0.1 to 0.2μm thick have been prepared by reactive magnetron sputtering, the target being an iron plate to which osmium pellets were attached. Coercivity and coercive squareness increased with osmium content, to maximum values of 2100 Oe and 0.81, respectively. Osmium doping also brought about field-induced anisotropy which greatly increased the coercive squareness parallel to the easy axis, a figure of 0.96 being obtained with 0.88 to 5.2 atomic per cent osmium. Osmium also suppressed grain growth during preparation, giving crystallites about 400 Å in diameter which improves the signal to noise ratio, an advantage for increasing recording density and read back amplitude.