the penetration of water and the dissolved oxygen or ions it carries through the coating.

According to an aspect of the present disclosure there is provided a composition suitable for coating a metallic substrate that is susceptible to corrosion characterised in that the composition comprises a carrier medium and graphene platelets in which the graphene platelets comprise between 0.002 wt% and 0.09 wt% of the coating, and the graphene platelets comprise one of or a mixture of two or more of graphene nanoplates, bilayer graphene nanoplates, few-layer graphene nanoplates, and / or graphite flakes in which the graphite flakes have one nanoscale dimension and 25 or less layers.

In another aspect, there is provided a coating system for a metallic substrate that is susceptible to corrosion for creation of a first coating on the metallic substrate, and, subsequently, a second coating over the first coating characterised in that the first coating comprises a composition as defined above, and the second coating is formed from a second composition which comprises a carrier medium and 2D material/graphitic platelets in which the 2D material/graphitic platelets comprise more than 0.1 wt% of the second coating.

In another aspect, there is provided a method of treatment of a metallic substrate in which the substrate is coated with a composition as defined above.

In another aspect, there is provided a method of treatment of a metallic substrate in which the substrate is treated with the system as defined above.

Graphite flakes with one nanoscale dimension are comprised of at least 10 layers of carbon atoms. Preferred graphite flakes are graphite flakes with one nanoscale dimension and 10 to 20 layers of carbon atoms, graphite flakes with one nanoscale dimension and 10 to 14 layers of carbon atoms, graphite flakes with one nanoscale dimension and 25 or less layers of carbon atoms, graphite flakes with one nanoscale dimension and 20 to 25 layers of carbon atoms. It is preferred that the graphite flakes have lateral dimensions ranging from around 100 nm to 100 μm.

In some embodiments of the present invention at least 50 wt% of the graphene platelets graphite flakes with one nanoscale dimension and 25 or less layers.

In some embodiments of the present invention the graphene platelets comprise between 0.002 wt% and 0.004 wt% of the coating, between 0.003 wt% and 0.004 wt% of the coating between 0.0026 wt% and 0.04 wt% of the coating, between 0.0026 wt% and 0.0035 wt% of the coating, between 0.006 wt% and 0.009 wt% of the coating, around 0.003 wt% of the coating, or around 0.03 wt% of the coating.

A coating using such compositions has been found to have a packing density of the graphene platelets which is sufficiently low that the graphene platelets are fully encapsulated within the carrier medium and the majority of the graphene platelets are not in physical and / or electrical contact with any other graphene platelets.