Graphene is the hottest thing in solid-state science to my mind. And I can’t be the only one with that opinion. The excitement was almost palpable at the recent Spring meeting of the European Materials Research Society (EMRS), where two of the symposia held joint sessions on the new material and its remarkable properties.

The discovery of zero-dimensional fullerenes and one-dimensional nanotubes left one form of carbon, graphite, behind. But now there’s a truly two-dimensional material – a single atomic layer – that has opened a new chapter in the world of materials science. This new chapter is being written by researchers from around the world, who are exploring the properties of graphene, the material that’s made of a single layer of graphite. Graphene is a semimetal that has a bandgap, which means it can be doped to be a semiconductor. It has a high carrier mobility, which makes it a good candidate for use in electronics. It also has a high thermal conductivity, which makes it useful for applications such as heat sinks.

Graphene is made by exfoliating graphite using a technique called chemical vapor deposition (CVD). The CVD process involves heating graphite in an oxygen-free environment, which causes the carbon atoms to bond together to form graphene. Once the graphene is deposited on a substrate, it can be transferred to other substrates or to a substrate-free surface. This makes it possible to use graphene in a wide variety of applications, such as electronics, sensors, and energy storage devices.

One of the most interesting properties of graphene is its ability to conduct electricity. The conductivity of graphene can be controlled by applying a voltage to the graphene, which allows it to be used as a switch. Graphene is also an excellent conductor of heat, which makes it useful for applications such as thermal management.

Graphene is also being used in a variety of other applications, such as sensors, and energy storage devices. It’s being used to create new types of solar cells, and it’s also being used to create new types of batteries. Graphene is also being used in the field of medicine, where it is being used to create new types of drug delivery systems.

Graphene is a truly two-dimensional material, and it’s being used to create new materials that have never been possible before. It’s a materials science endeavor that has the potential to revolutionize the way we think about materials.

Graphene is setting the world of materials science alight, constantly revealing new surprises.

Jonathan Wood