



FennoFlakes: a project for identifying flake graphite ores in the Fennoscandian shield and utilizing graphite in different applications

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Natural graphite is a strategic mineral, since the European Commission stated (Report on critical raw materials for the EU (2014)) that graphite is one of the 20 most critical materials for the European Union. The EU consumed 13% of all flake graphite in the world but produced only 3%, which stresses the demand of the material. Flake graphite, which is a flaky version of graphite, forms under high metamorphic conditions. Flake graphite is important in different applications like batteries, carbon brushes, heat sinks etc. Graphene (a single layer of graphite) can be produced from graphite and is commonly used in many nanotechnological applications, e.g. in electronics and sensors. The steps to obtain pure graphene from graphite ore include fragmentation, flotation and exfoliation, which can be cumbersome and resulting in damaging the graphene layers. We have started a project named FennoFlakes, which is a co-operation between geologists and chemists to fill the whole value chain from graphite to graphene:

1. Exploration of graphite ores (geological and geophysical methods).
2. Petrological and geochemical analyses on the ores.
3. Development of fragmentation methods for graphite ores.
4. Chemical exfoliation of the enriched flake graphite to separate flake graphite into single and multilayer graphene.
5. Test the quality of the produced material in several high-end applications with totally environmental friendly and disposable material combinations.

Preliminary results show that flake graphite in high metamorphic areas has better qualities compared to synthetic graphite produced in laboratories.