It will be ideal as a material scientist if his discovery of a new material can stimulate greatly people in scientific communities, and furthermore if it can bring about some useful products into our everyday life.

I will speak briefly the background with emphasis on usefulness of modern electron microscopy how the carbon nanotubes (CNTs) were discovered [1]. The nanotubes are sized in nanometer-scale, so that the conventional microscopy is not useful to those nanotubes but only high-resolution electron microscope is. It is very much fortunate for me having been using the instrument for characterizing nanostructures of a variety of materials including nano-carbon materials.

Many unique properties of CNT, the basic structure being graphene of a hexagonal network of carbon atoms, come from their cylindrical forms and nanometer sized diameters as well as hybridized electron orbits of carbon atom, which are not found in conventional materials. Their cylindrical form and nanometer-sized structure have brought a new concept to condensed matter physics and materials science. For example, a single filament of CNT will be semiconducting or electrical conducting depending upon the CNT morphologies. The latter property has been utilized as electrically conductive and flexible polymer films for touch-panel applications.

Structural characterization of nano-materials using high resolution electron microscopy has progressed greatly and now atomic details of the materials are investigated. The modern electron microscopes include elemental analysis such as electron energy loss spectroscopy (EELS) [2] and energy dispersive X-ray analysis (EDX) at individual atom basis [3]. Some of typical examples of atomic details of CNTs, graphene sheets and related nano-carbon materials will be demonstrated.