Method to produce suspensions using encapsulated metal nanopowders

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Overview

Backgrounds

EB-PVD technology

TEM investigation

Method to produce suspensions

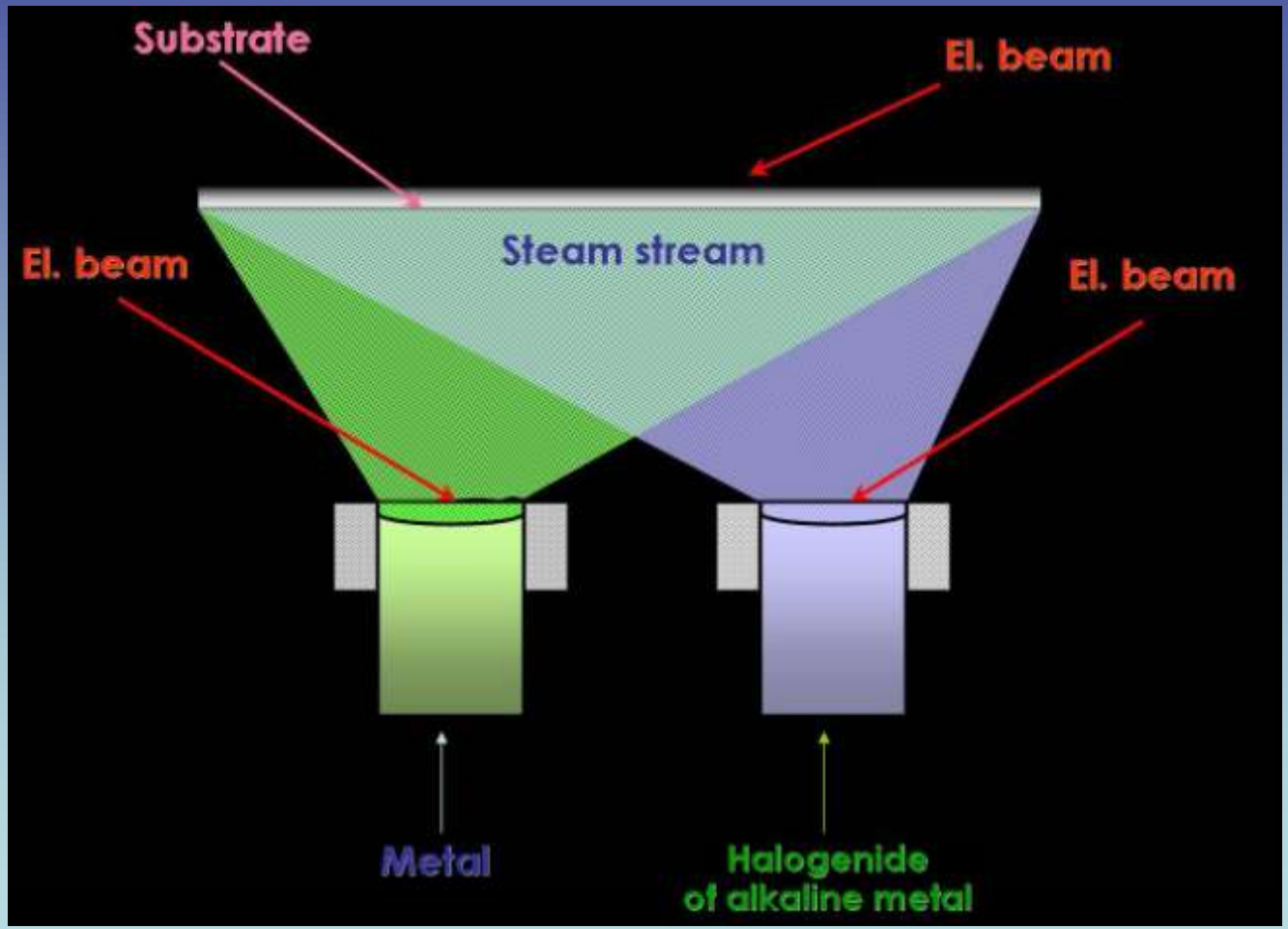
Resume

Backgrounds

- **Topicality:** Change of fundamental properties of traditional materials in nanodisperses condition, such as decrease temperature of the beginning of melt, heat of evaporation, energy of ionization, work of an output electrons , etc. opens ample opportunities in the field of creation of the newest materials and the technologies, essentially new devices.

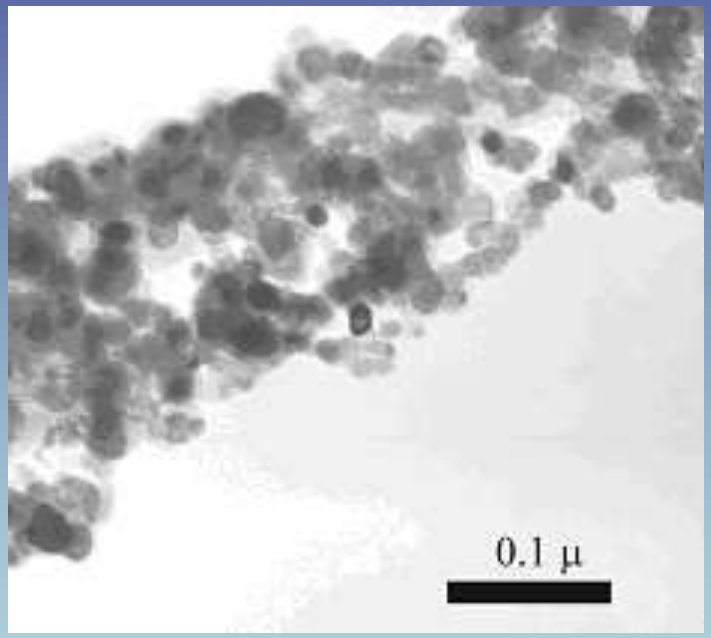
- **The objective of work:** producing a stable suspension based on substances suitable for application in different fields, for example agriculture (plant growing and cattle breeding), using nanoparticles of metals encapsulated into salt matrix (NaCl) as precursors.

EB-PVD technology

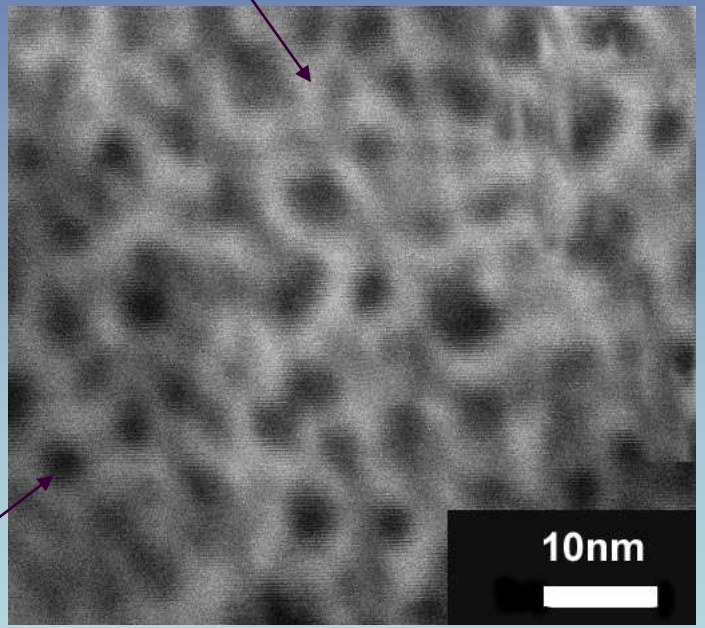


TEM investigation

Typical microstructure of a composite



Matrix of salt

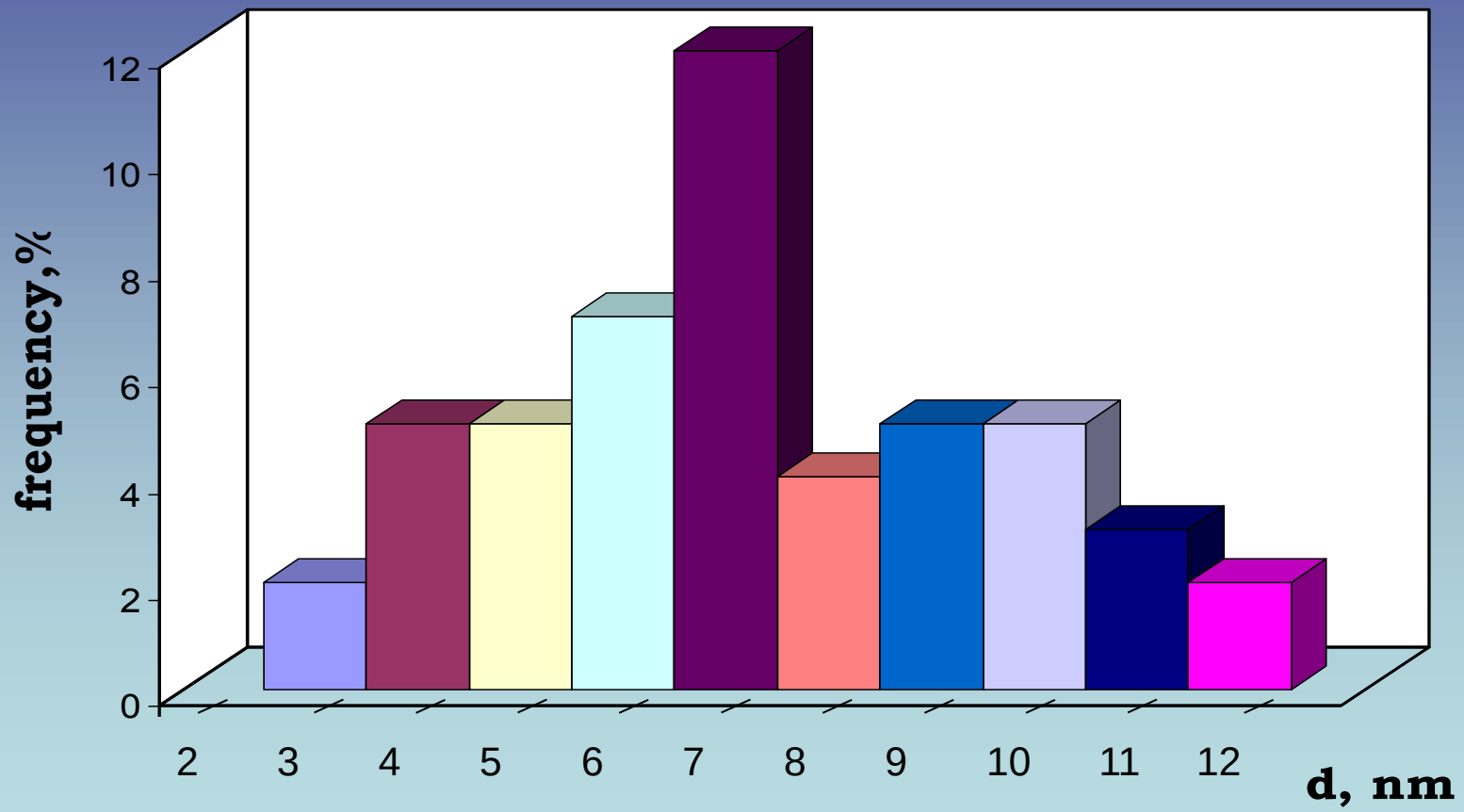


4 nm Cu-particle !

TEM bright field image
Hitachi H-800, 200kV

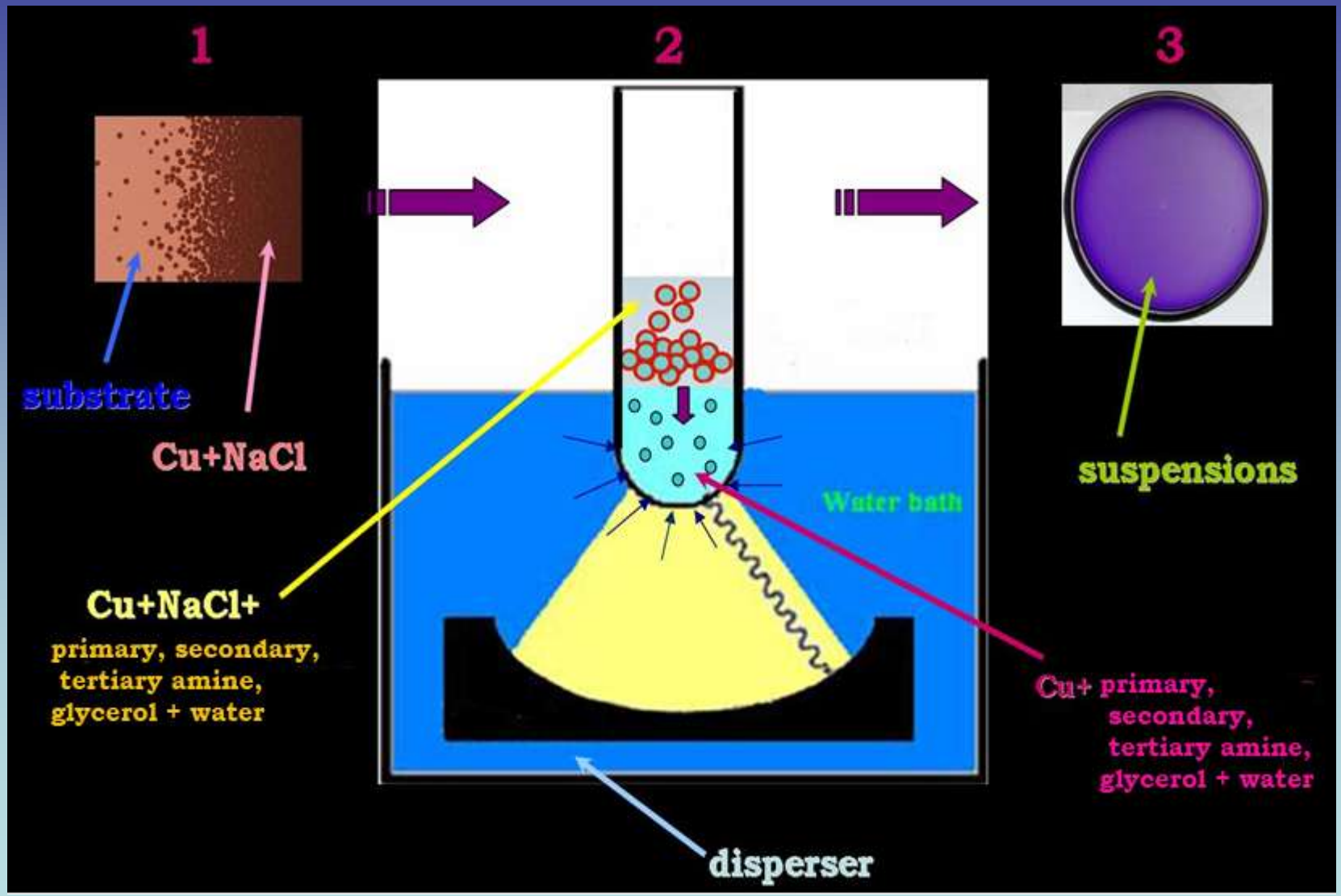
Structure investigation

Cu-particles sizes distribution by electronic microscopy data

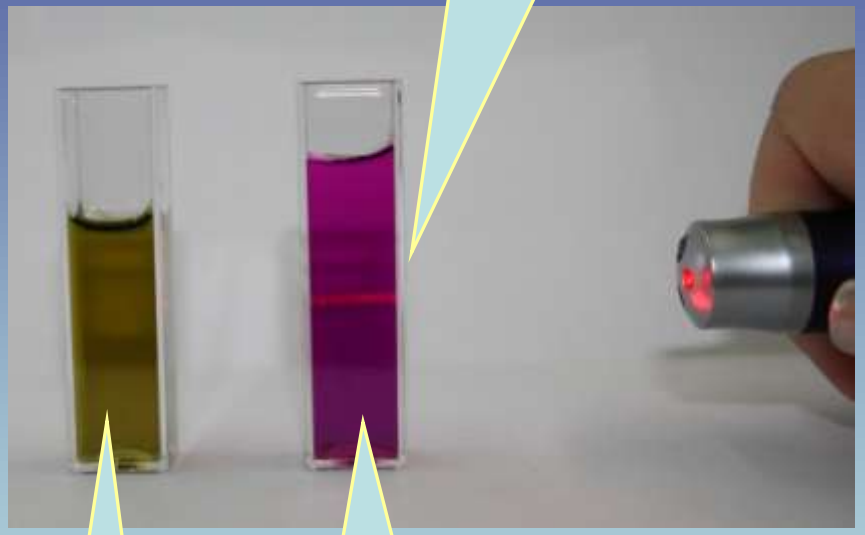


Patent Ukraine №82448 A method of producing encapsulated powders and unit for its realization. Ustinov A, Melnychenko T., Liapina K., Chapluk V.

Method to produce suspensions



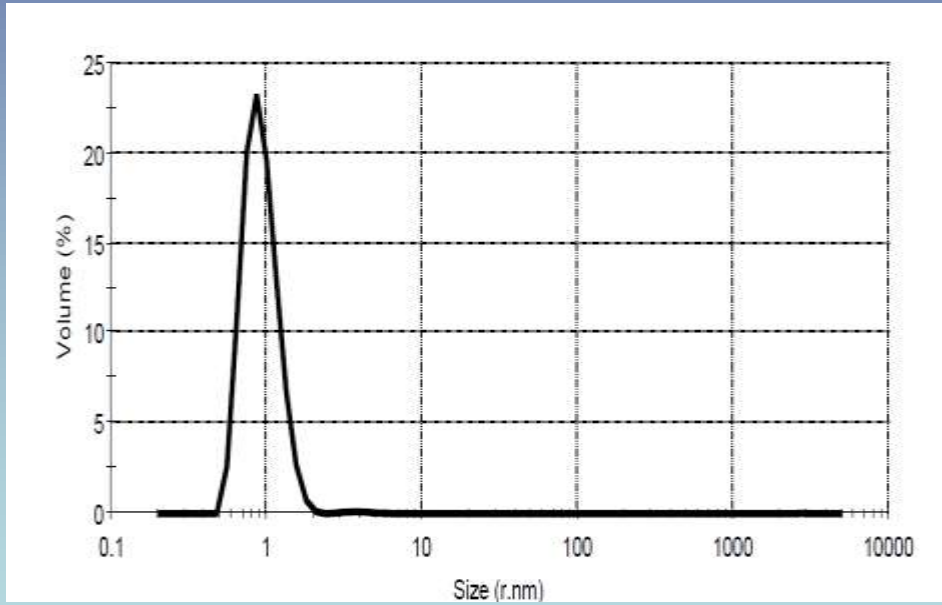
Exterior view of the suspension with different concentrations of precursor



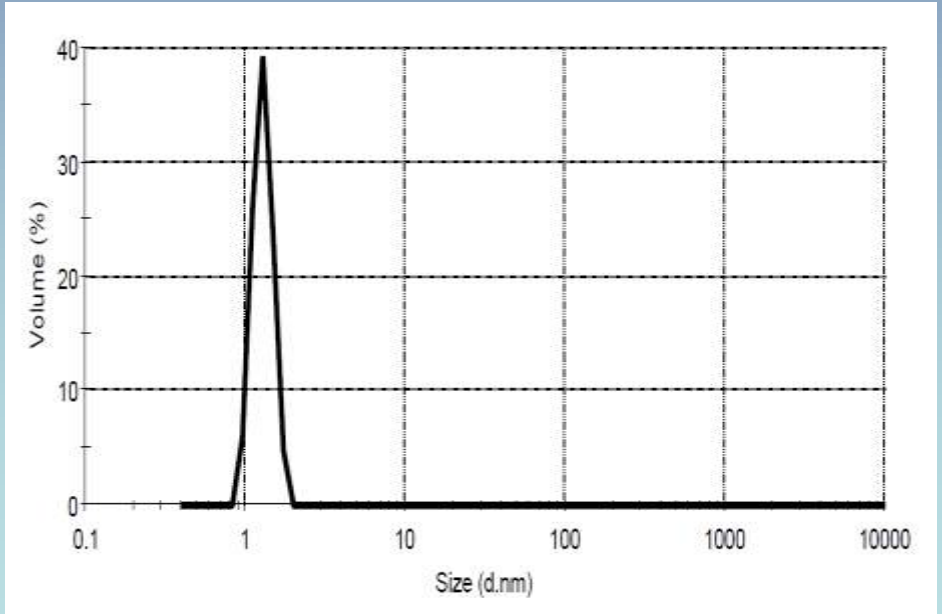
dispersion time - 1hour
temperature of the dispersion – 80C

Cu-particles sizes distribution

The particle size distribution in suspension from on primary, secondary and tertiary amines + water



The particle size distribution in suspension from on the basis of glycerol + water



Resume

Research of structure and properties of condensates of the inorganic materials received by electron beam evaporation and deposition on a substrate at presence of a gas phase of fusible connections or inert gases, it is established that:

• By change of conditions of deposition of steam streams of inorganic materials of probably reception of not consolidated materials (powders), the sizes particles in which has NANOPARTICLES scale.

• The possibility of obtaining stable suspensions of nano-sized metal particles scale by dissolving the salt shell nanopowders with various liquids, such as water-soluble primary, secondary and tertiary amines, glycerol-water.

•The narrow dispersion of nanoparticles (5 nm up) suggests that the initial encapsulated nanoparticles of 3-d metals have a narrow dispersion in the transition to organic suspension does not undergo physical changes.

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Thanks For attention