# Atmospheric pressure arc plasma technology as a tool for the production of fine dispersed particles

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There exist many difficulties producing micro- and nanopowders, such as agglomeration of particles, bright size and shape distribution, contamination from the surfaces of processing equipment, difficulty to achieve fine particle in required yield. The thermal DC arc plasma is a unique ambient and may be employed for formation of fine particles or granules. This process may occur during plasma spraying and deposition of coatings for wide range of applications.

The equipment for producing of plasma jet consists of the plasma torch with power supply, gases supply, water-cooling systems and airing devices. The linear, sectional DC arc plasma source was designed and manufactured by authors of presented work. It contains hot hafnium cathode, arc ignition section, neutral rings for feeding of working gas, neutrode and step-formed anode made of high purity copper.

The SEM micrographs showed the features of processed ceramic particles injected into plasma jet reactor. (Fig. 1.). Shape and size of particles before and after plasma treatment is different and depend on several factors including the plasma operating regime. Significant differences have been observed depending on plasma torch arc current. The $Al(OH)_3$ powder particles deposited into distillated water showed the minimal size and streamline shape. Visual and SEM observations confirmed that aluminum hydroxide particles passing the thermal plasma treatment proved to be suitable for wide range application especially for further deposition of catalytic and tribological coatings.

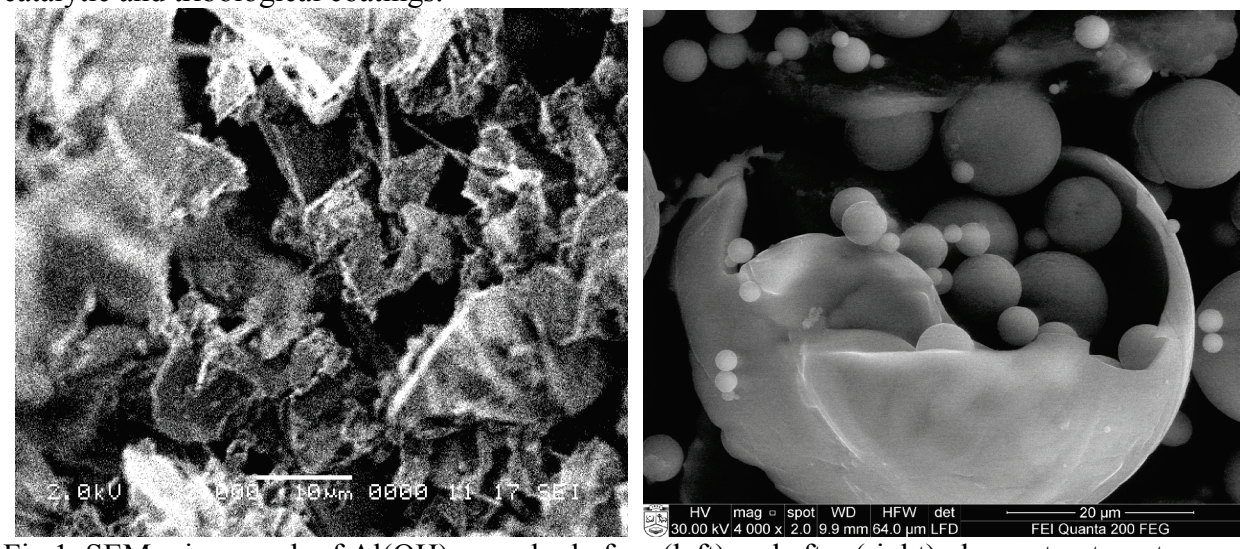


Fig 1. SEM micrograph of $Al(OH)_3$ powder before (left) and after (right) plasma treatment

It is important to notice that employing the presented method is possible to obtain nano-sized particles and nanostructured coatings. Deposited particles are mainly spherical their sizes vary from 20 to 300 nm.

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