

# **Plasma nanotechnology for large scale production of nanomaterials with advanced applications**

Uros Cvelbar

*Jozef Stefan Institute, Jamova cesta 39, SI-1000 Ljubljana, Slovenia  
uros.cvelbar@ijs.si*

The presentation title reflects the quest for the most efficient nanowire synthesis routes and advance properties of those NW for devices like gas sensors, dye solar cells and closed-loop cells. Today the large quantities of nanomaterial like nanowires (NW) are needed to overcome the large market price of nanomaterial and make nanotechnology widely available to general public use, and application to numerous devices. To make this step, we need to move forward and indentify the most efficient methods which yield sufficient amounts of NW. Here the plasma-assisted synthesis leads the way, not only in NW quantity but quality as well.

When dealing with synthesis of NW, we always have to look at 3-dimensional problem, since the large-scale synthesis is connected with the time, quantity and quality of nanostructures. Normally it is not sufficient that your yields are high, but the quality of your nanostructures needs to be good and have advanced properties (meaning uniformed shape, single-crystalline, lattice superstructure, absence of impurities, etc.)

Plasma technologies for synthesis or modification of nanowires, nanotubes, nanoparticles or other nanostructures might play key role in near future, especially plasma flight-thru methods. This can be the way how to produce sufficient amounts not only of NWs, but also quantum dots, core-shell quantum dots for PVs, etc. However many problems connected with production process and technology implementation need to be addressed before.