אוניברסיטת בן-גוריון בנגב
Ben-Gurion University of the Negev

מכון אילזה כ"ץ למדע וטכנולוגיה בתחום הננומטרי
Ilse Katz Institute for Nanoscale Science and Technology

Nanotechnology Seminar, Wednesday, November 28th, 12:00
IKI Auditorium, Building 51, room 015

Photo-Thermal Directed Assembly

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Abstract:
The laser-induced microbubble technique (LIMBT) has been developed recently for micro-patterning of various materials. In this method, a laser beam is focused on a dispersion of nanoparticles (NPs), leading to the formation of a microbubble due to laser heating. Convection currents around the microbubble carry NPs that are then pinned to the bubble/substrate interface. Moving the focused beam results in migration of the microbubble and the deposition of material at the bubble/substrate contact area.
We found1 that controlling the construction and destruction of the microbubble through modulation of the laser, enables the formation of continuous patterns by preventing the microbubble from being pinned to the deposited material. Moreover, we show that a similar mechanism could explain microstructure formation from an ion solution. Photo-thermal reduction leads to formation of NPs that are then pinned to the bubble/substrate interface. This innovative approach can be applicable or producing thin conductive patterns and allow fabrication of microelectronic devices and sensors.

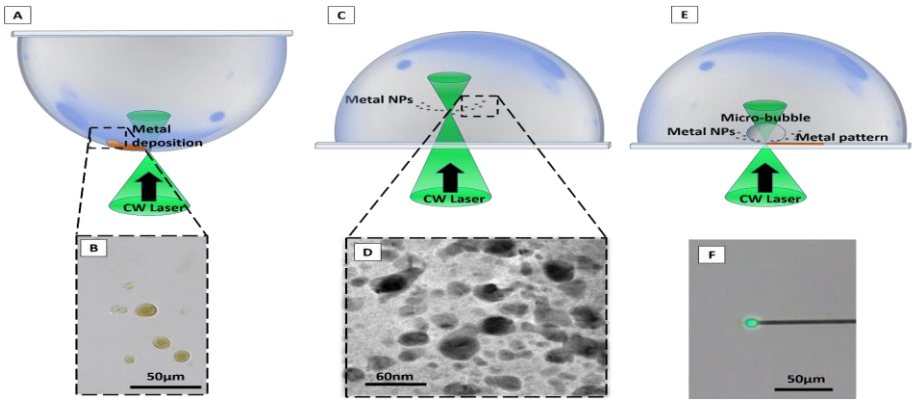

Illustration of deposition processes for different laser focus positions: (A) at the interface between the solution droplet and air, (B) inside the solution and (C) at the substrate/solution interface. The inset in each figure shows the deposits (bright- field microscopy image for A,C and TEM for B).

1.Armon, N., Greenberg, E., Layani, M., Rosen, Y. S., Magdassi, S. & Shpaisman, H. Continuous Nanoparticle Assembly by a Modulated Photo-Induced Microbubble for Fabrication of Micrometric Conductive Patterns. ACS Appl. *Mater. Interfaces* **9,** 44214–44221 (2017).