

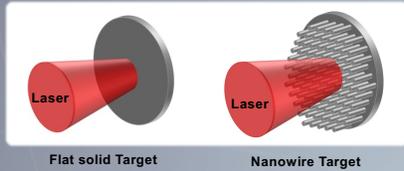


Nanostructured Targets^[1]

A. A. Jara, A. C. Basaran, N. M. Vargas, F. Elsner, and C. Monton
 General Atomics, P.O. Box 85608, San Diego, California 92186

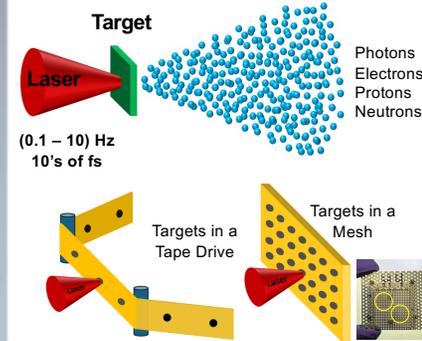
1. Introduction

Development of new target surfaces and materials to study the physics of the interaction of intense laser pulses with nanostructures and their promising applications in X-ray and g- ray generation, ion and electron acceleration, and fusion neutron generation.



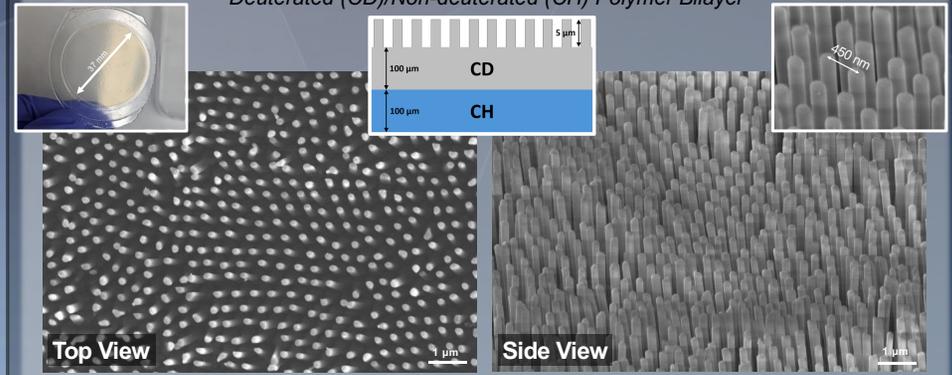
Compared to flat solid targets, nanowire targets produce about **500 times** more fusion neutrons [2].

High-Repetition-Rate Experiments



2. Nanowire (NW) Target

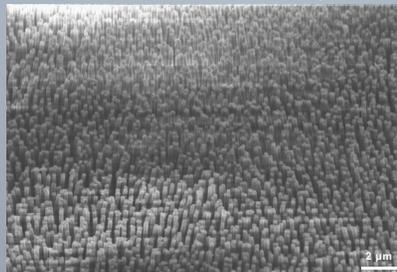
Deuterated (CD)/Non-deuterated (CH) Polymer Bilayer



3. Dopants and Nanoparticles (NPs) in CH or CD NWs

Doped CH or CD NWs

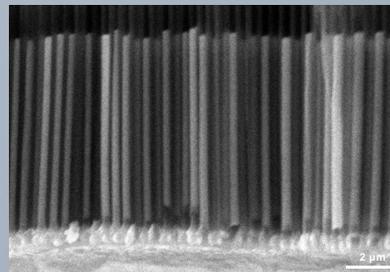
Uniform distribution of dilute dopants.



Material: Chlorine-doped NWs/ Discrete NWs/ 5 μm long / 200 nm diameter/ 450 nm inter wire distance

Metallic NWs

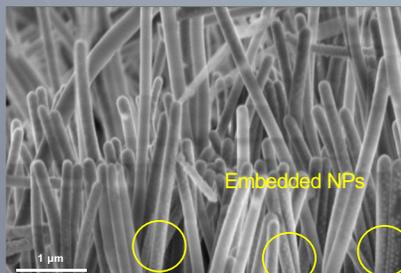
Pure metals and metallic alloys.



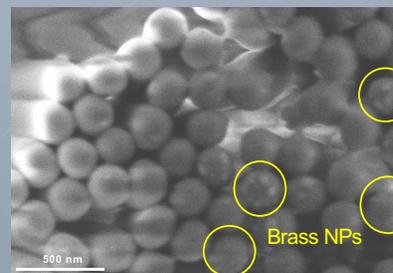
Material: Nickel NWs/ not processed NWs/ 7 μm long / 200 nm diameter/ 450 nm inter wire distance

Embedded NPs in CH or CD NWs

Broad availability of materials. Precise control of concentration of NPs.



Material: Silica NPs in Epoxy NWs/ Discrete NWs/ 7 μm long / 200 nm diameter/ 450 nm inter wire distance



Material: Brass NPs in CH NWs/ not processed NWs/ 6 μm long / 250 nm diameter/ 450 nm inter wire distance

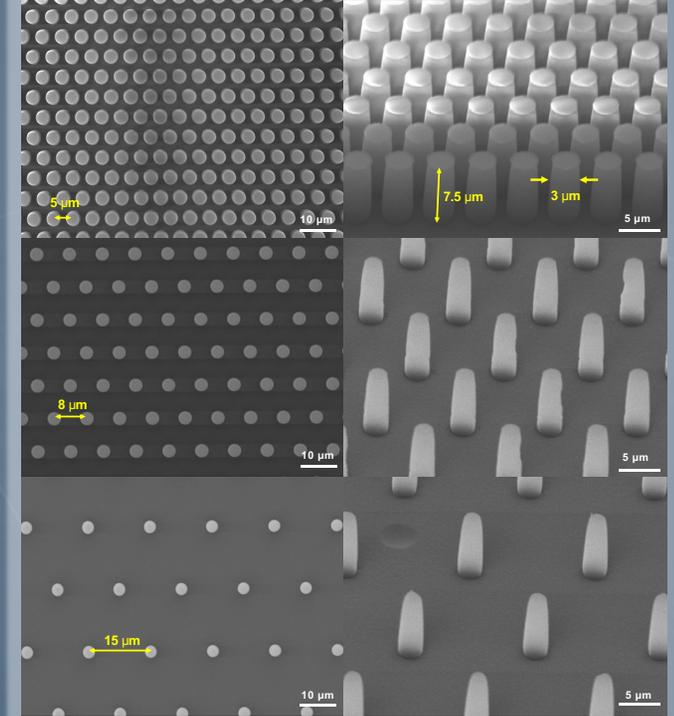
NW material	Dopant	Conc.
CD or CH	Cl	< 6 at. %
CD or CH	Cu	< 0.1 at. %
CD or CH	Fe	< 1 at. %
CD or CH	Ni	< 0.1 at. %

NW material	NPs	Conc.
CD or CH	Brass	up to 40 wt. %
CD or CH	CuOx	Maximum (**)
CD or CH	Cu	Maximum (**)
CD or CH	Boron (***)	-
Epoxy	SiO2	Maximum (**)
Metals (*)	Ni	100 at. %

(*) Metallic NWs (Ni, Au, Cu, Pd, etc.) (**) Concentration obtained by completely filling the nanopore template before CH or CD injection. (***) Work in progress

4. Microwires – Filling Factor Control

Control of wire size and array geometry to enhance Laser-target coupling.



Material: CH wires/ 7.5 μm long / 3 μm diameter / 5 μm to 15 μm inter wire distance