



UPO

UNIVERSITÀ DEL PIEMONTE ORIENTALE
DIPARTIMENTO DI SCIENZE E INNOVAZIONE TECNOLOGICA

EVENTI DiSIT

Seminario | Seminar

07-10-2024

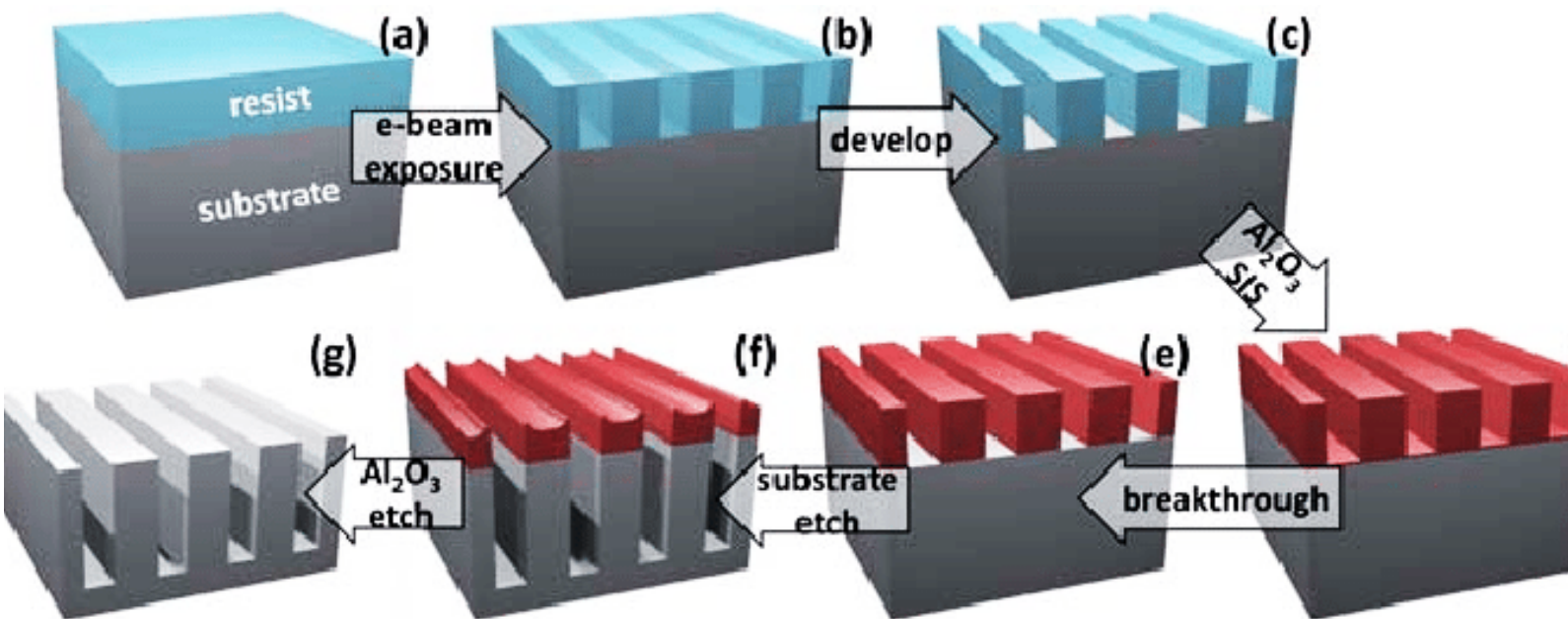
15:00-16:00

Aula 207

Atomic layer processes-a toolbox for sustainable materials

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Global problems such as plastic pollution and the growing demand for clean water require innovative materials with unprecedented control over composition and structure, at the nanoscale. Atomic layer processes, such as atomic layer deposition (ALD) and molecular layer deposition (MLD), are powerful techniques for thin, conformal growth of inorganic, hybrid, and organic materials with exceptional control over their nanoscale thickness using vapor precursors. In recent years, an additional process has joined this family- vapor phase infiltration (VPI), where ALD chemistry is employed to growth inorganic materials within polymers, creating hybrid materials with unique properties.

Here I will discuss how ALD, MLD, and VPI can be harnessed to address some of the challenges in sustainability. First, we have developed ZnO VPI and ALD processes that enable efficient growth of ZnO layers on difficult to nucleate polymer surfaces. These processes are used to form a nanometric UV absorbing coatings that can extend the polymers' usable lifetime, reducing plastic waste. Second, we utilized Al_2O_3 VPI and ALD to modify the interface of uni-porous, self-assembled block copolymer membranes, effectively tuning pore sizes from ultrafiltration to nanofiltration. The Al_2O_3 interface also enables control over the pores' composition, leading to high selectivity of nano-pollutes. Third, we demonstrate how MLD can be employed to grow layer-by-layer crosslinked, aromatic polyamides on top of ultrafiltration support membranes, producing highly smooth, ultra-thin composite (TFC) membranes. These MLD polyamide TFC exhibit high density, a high degree of cross-linking, and excellent water permeability and salt rejection. This highly controlled, versatile growth process opens a new pathway of membrane fabrication- one monomer at a time.

EVENTO APERTO A:

Docenti | Teachers, Borsisti | Research Fellows, Assegnisti | Postdoctoral researchers, Dottorandi | PhD students, Studenti | Students

SEMINARIO IN LINGUA: Inglese

