

Materiali per celle a combustibile

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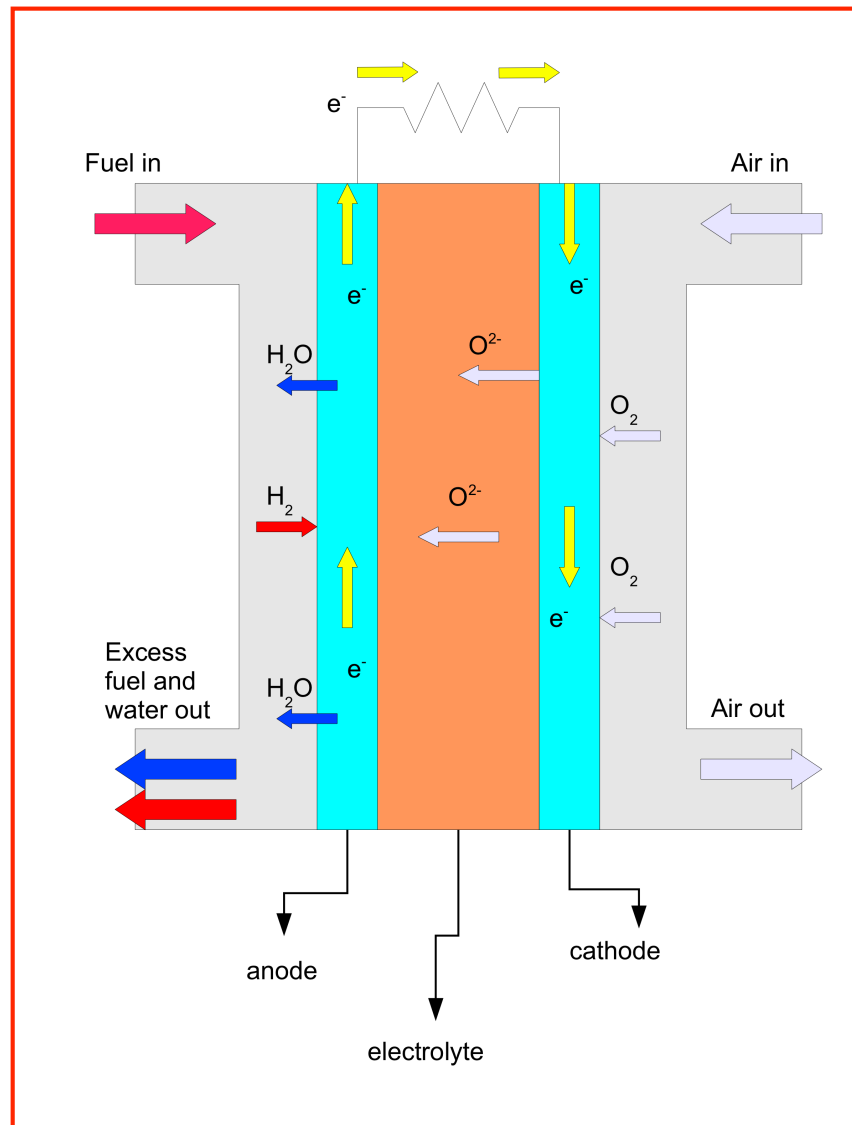
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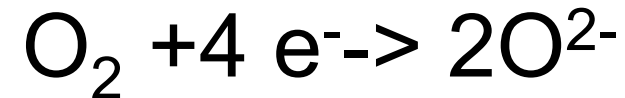
Come funziona una cella a combustibile?



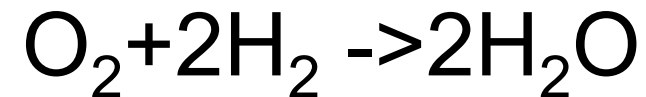
Anode reaction



Cathode reaction

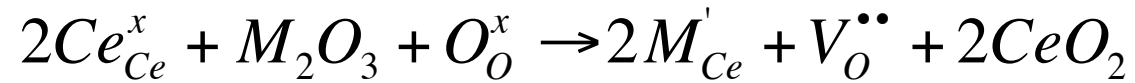


Overall reaction

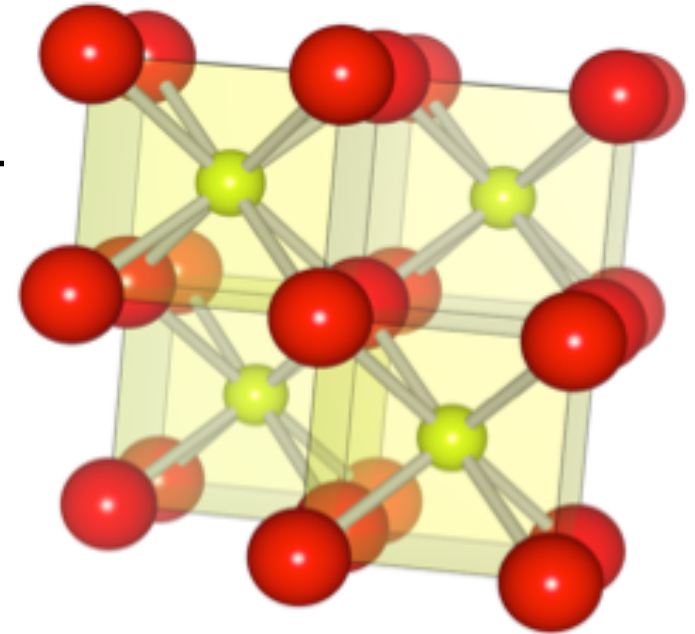


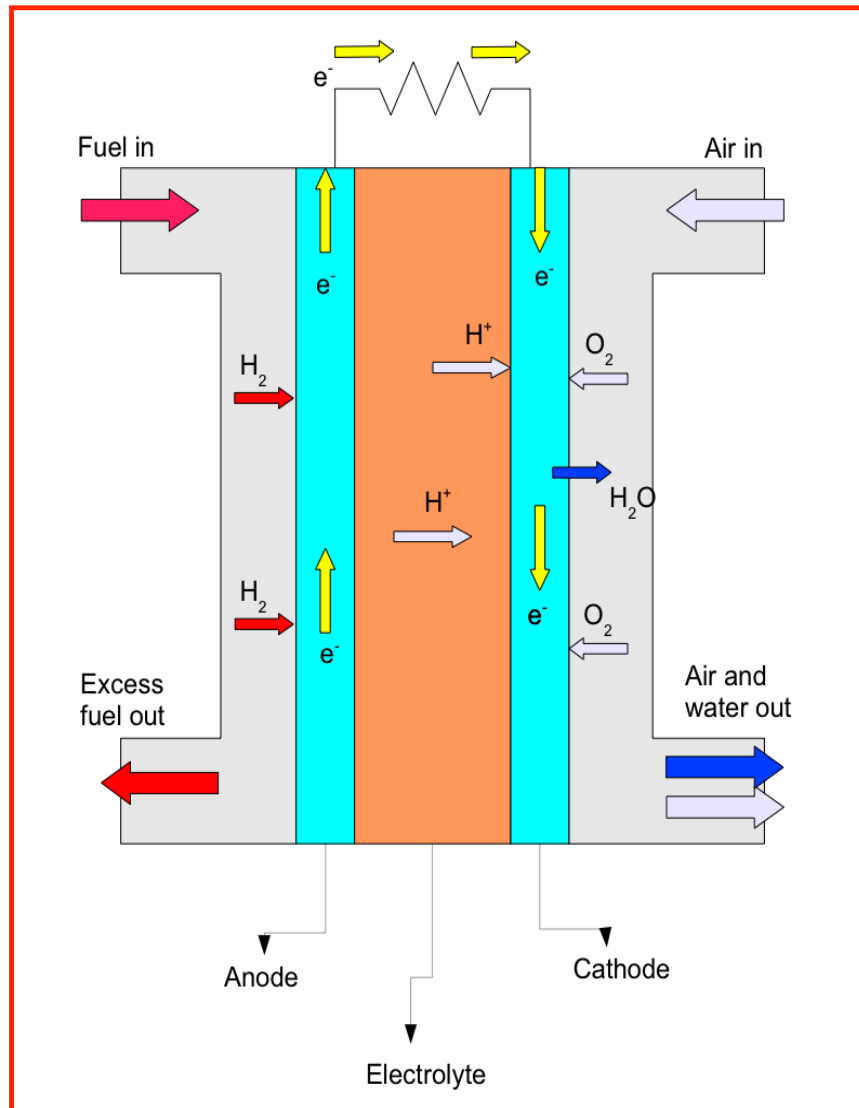
Oxide ion - conduction electrolyte

DOPANT INSERTION AND OXYGEN VACANCY FORMATION



- DO DOPANTS DISTRIBUTE UNIFORMLY IN THE MATRIX?
- WHERE ARE THE OXYGEN VACANCIES?

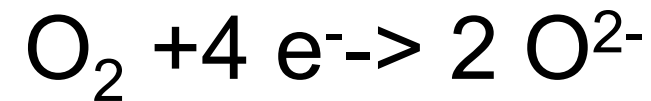




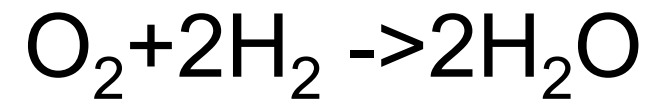
Anode reaction



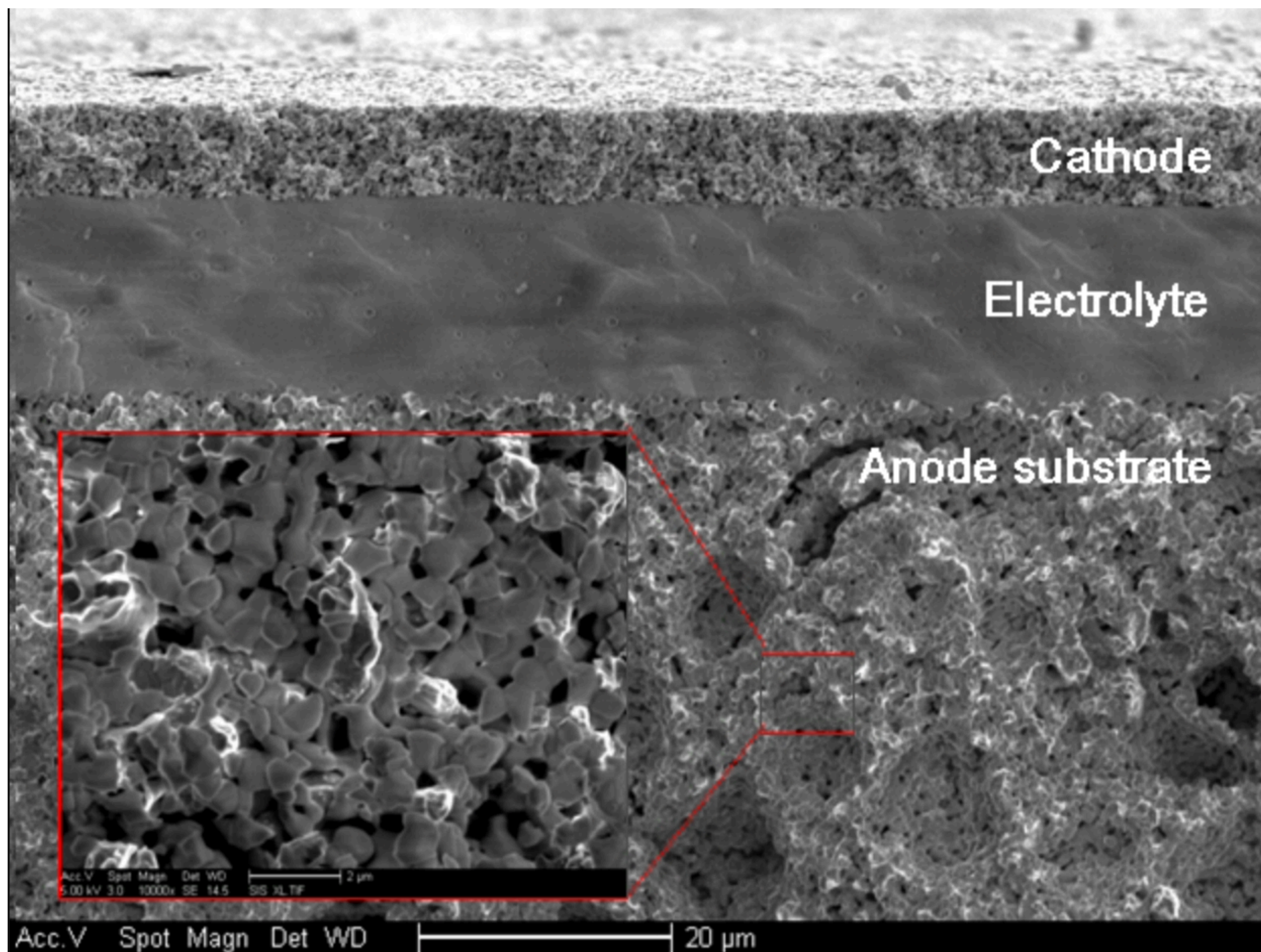
Cathode reaction



Overall reaction



Proton - conduction electrolyte

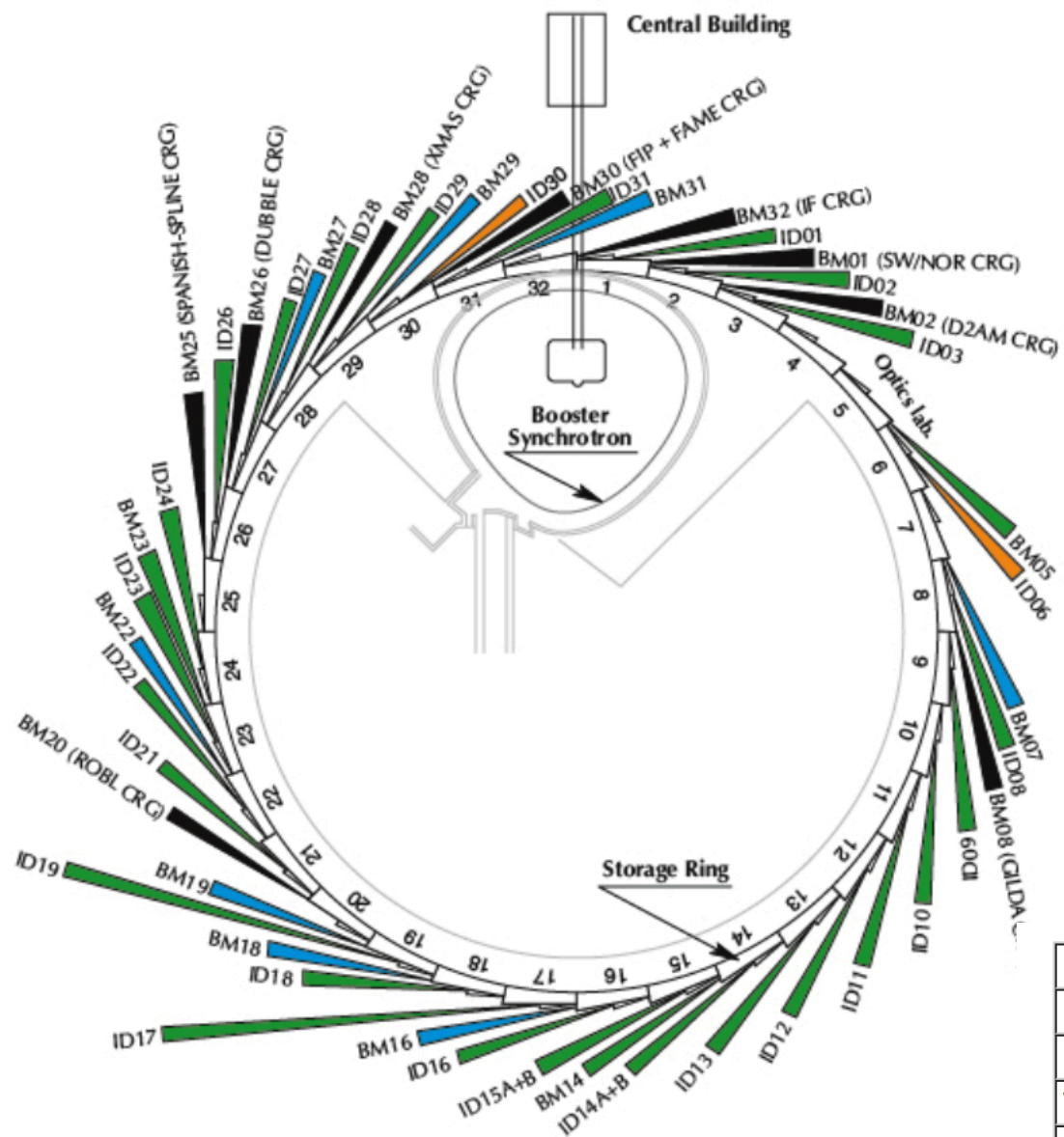


linee di ricerca sui materiali per celle a combustibile

- conduzione ionica a stato solido (elettroliti)
- conduzione mista ionica-elettronica e reattività agli elettrodi
- compatibilità elettrolita-elettrodo
- metodi sperimentali in laboratorio:
 - XRD
 - XPS
 - EIS
 - MICROSCOPIA ELETTRONICA
 - SINTESI CHIMICA
- metodi sperimentali con luce di sincrotrone:
 - HRXRD
 - X-RAY ABSORPTION SPECTROSCOPY
 - X-RAY MICROSCOPY
 - SCANNING PHOTOELECTRON MICROSCOPY

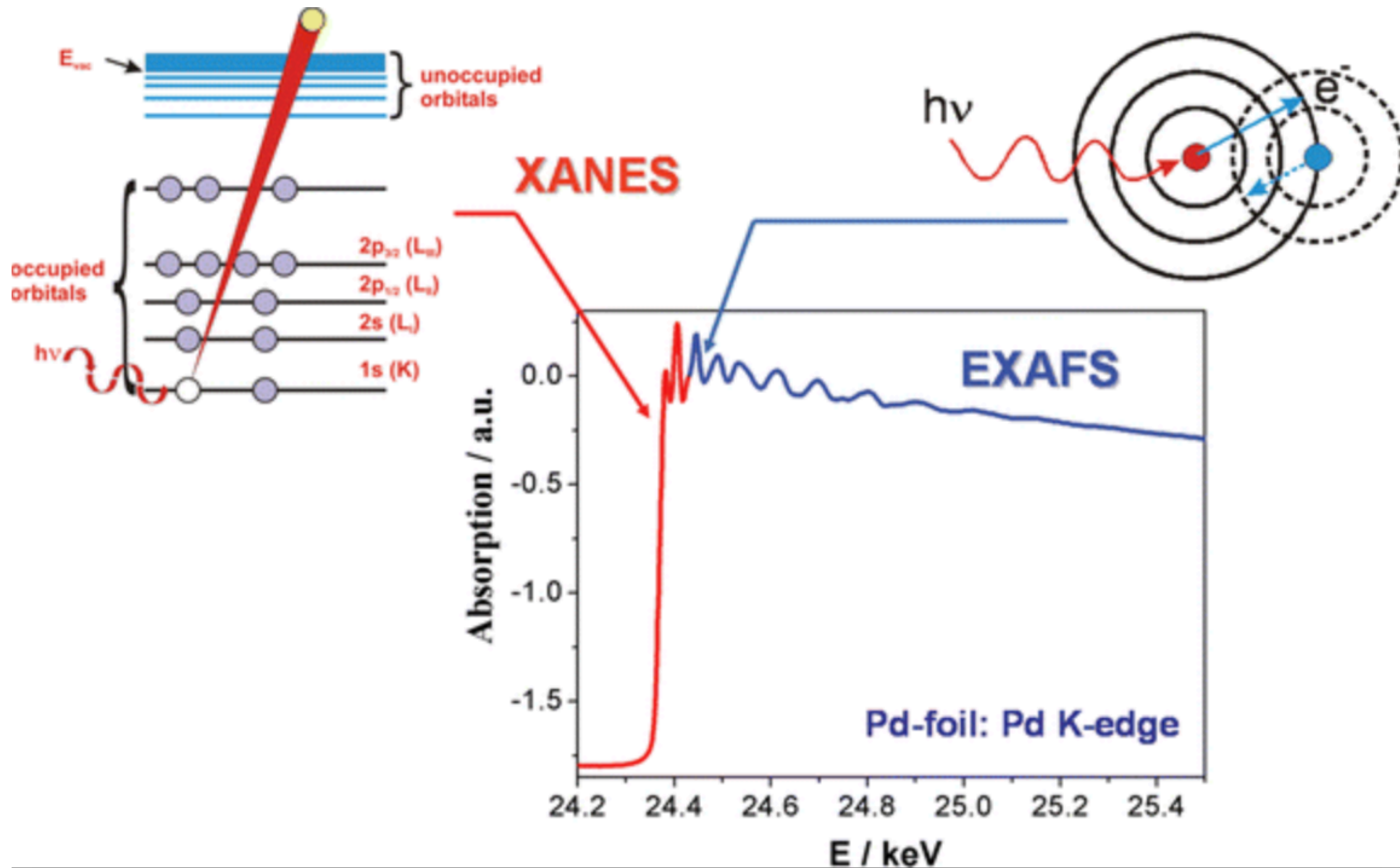
ESRF (www.esrf.eu)

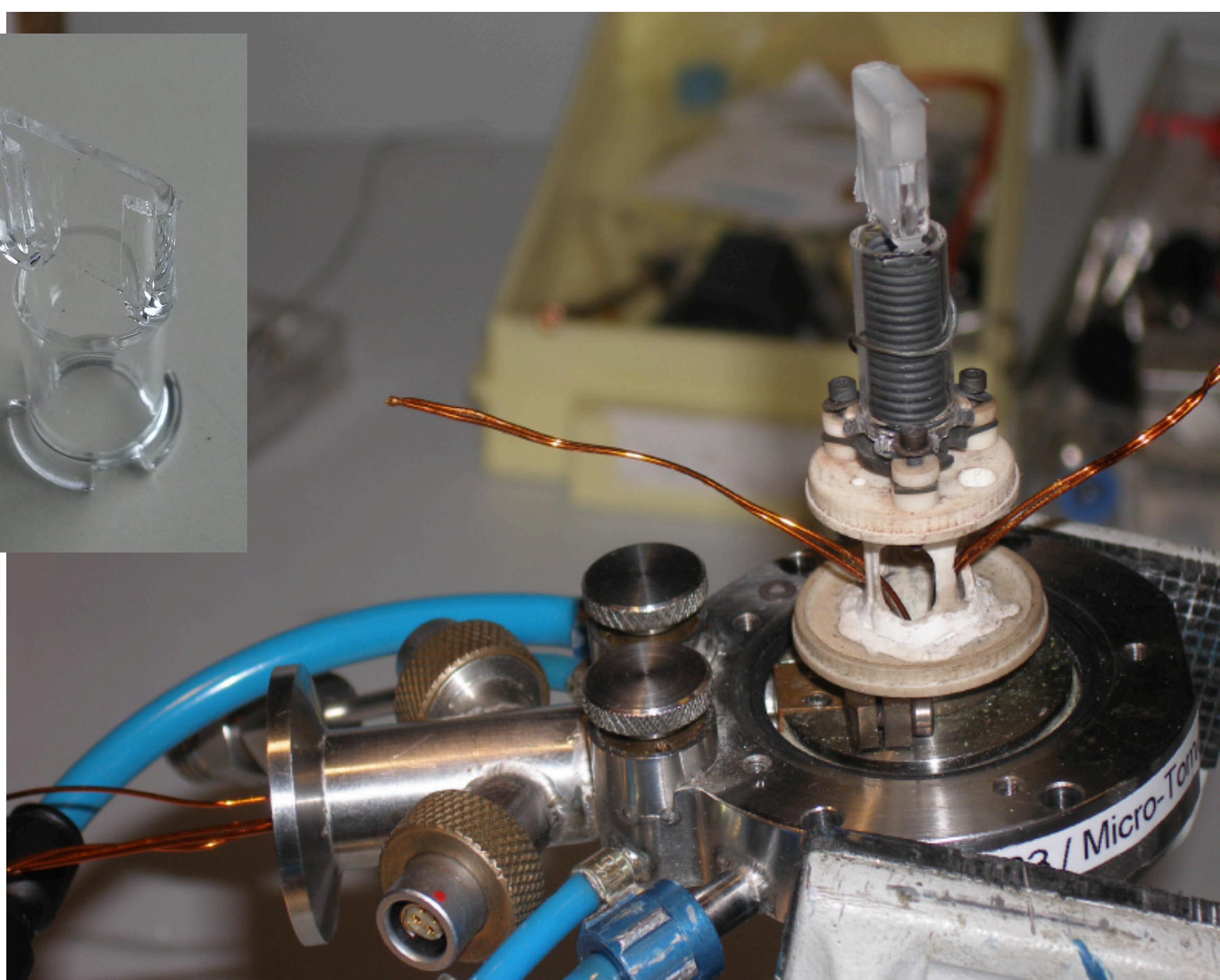




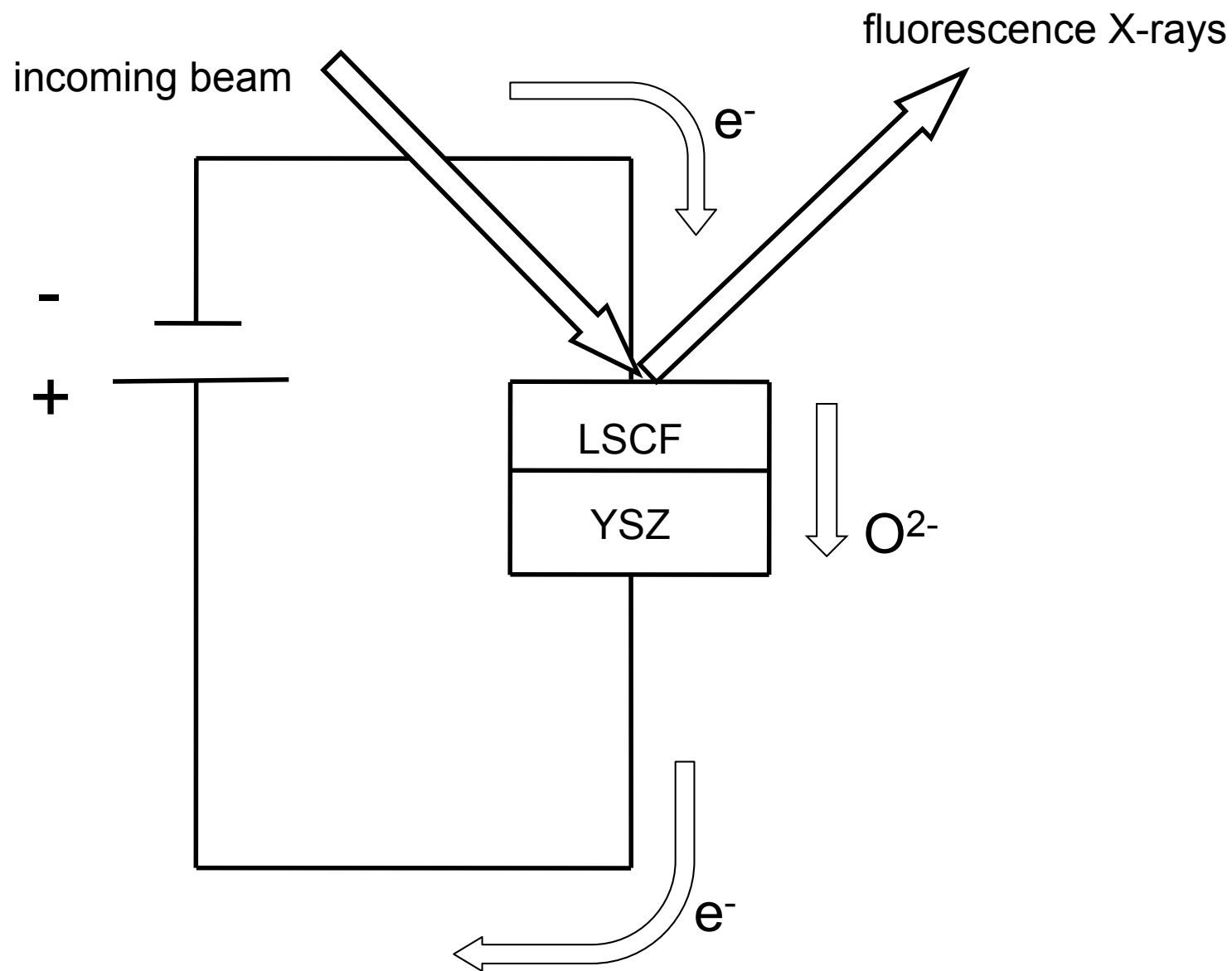
Energy	GeV	6.04
Maximum Current	mA	200
Horizontal Emittance	nm	4
Vertical Emittance	pm	4
Coupling	%	0.1
Revolution frequency	kHz	355
Number of bunches		1 to 992
Time between bunches	ns	2816 to 2.82

spettroscopia di assorbimento dei raggi X $I = I_0 \exp(-\mu x)$

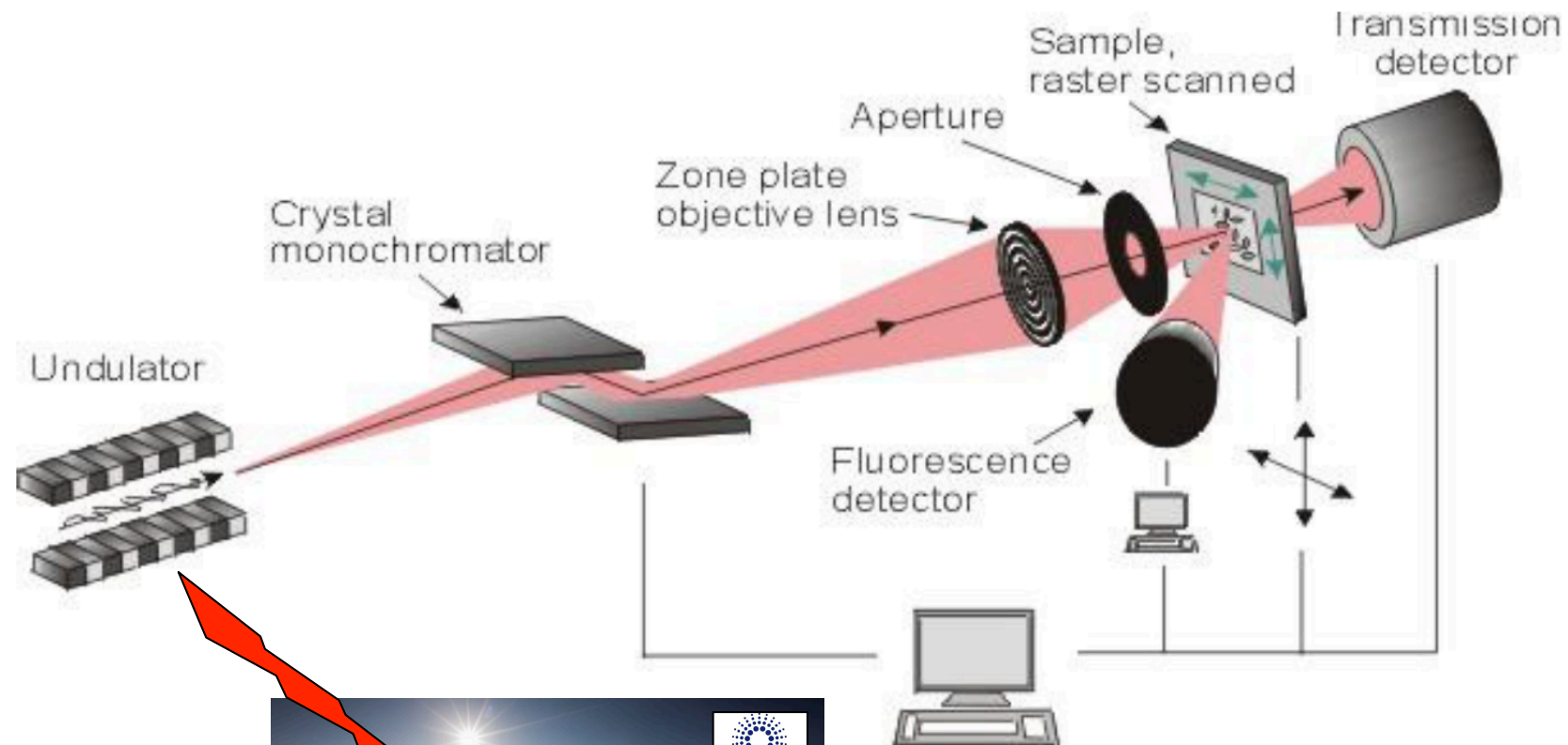


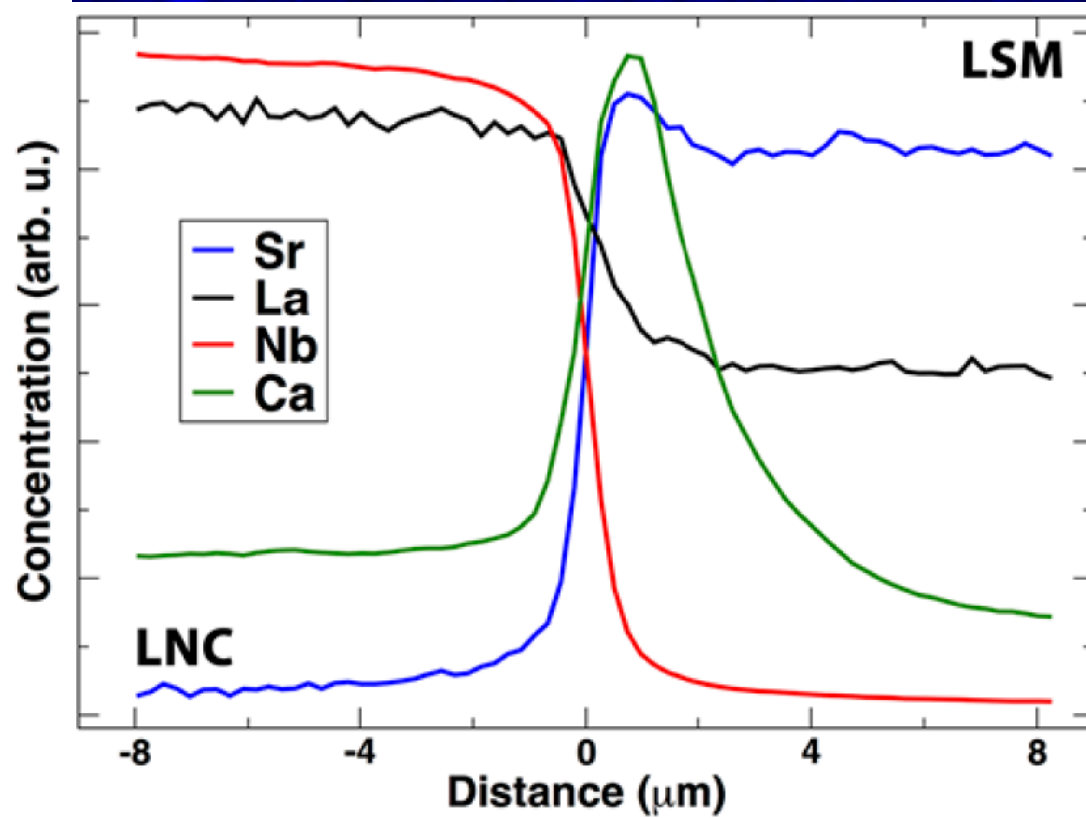
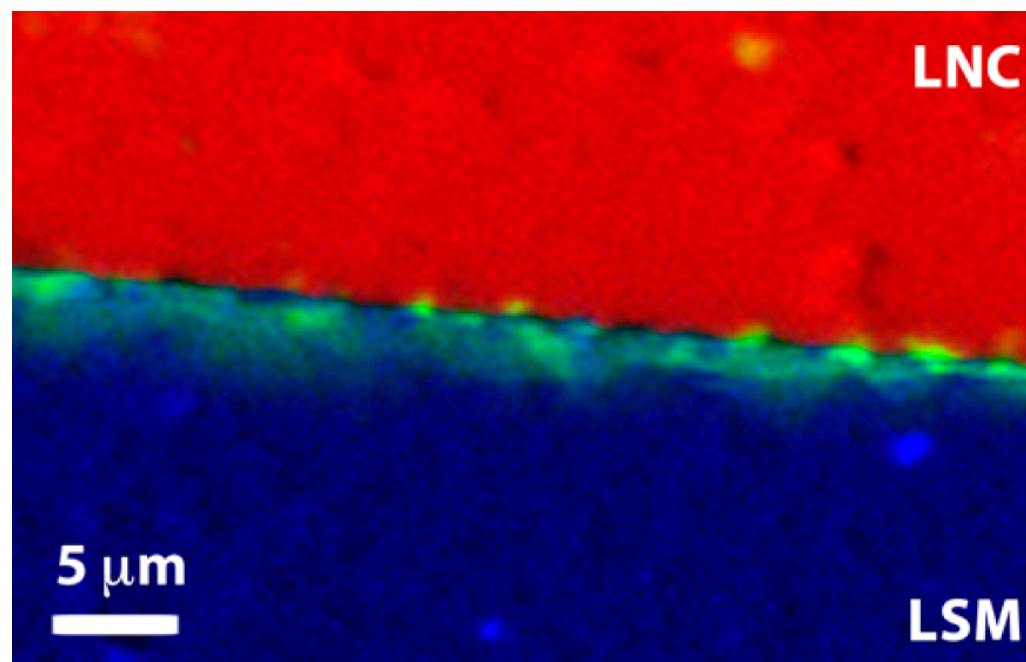


halfcell LSCF ($\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.8}\text{Fe}_{0.2}$) -YSZ (yttria-stabilized zirconia)



Scanning X-Ray Microscope (ID21)





argomenti di tesi

- progettazione e sintesi di elettroliti ibridi inorganici-organici
- analisi del meccanismo di conduzione ionica mediante simulazioni computazionali
- analisi strutturale di elettroliti e correlazione con la conduzione ionica
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- studio di interfacce elettrolita-elettrodo
- studio di reattività e conduzione ionica-elettronica di materiali anodici e catodici