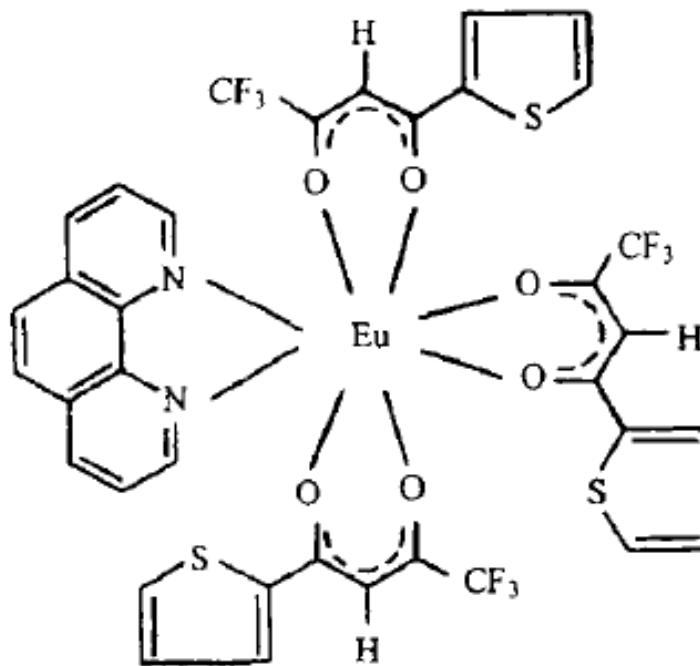


**ESPERIENZA 5**  
**SINTESI DI UN COMPLESSO LUMINESCENTE:**  
**[Eu(TTA)<sub>3</sub>(phen)]**

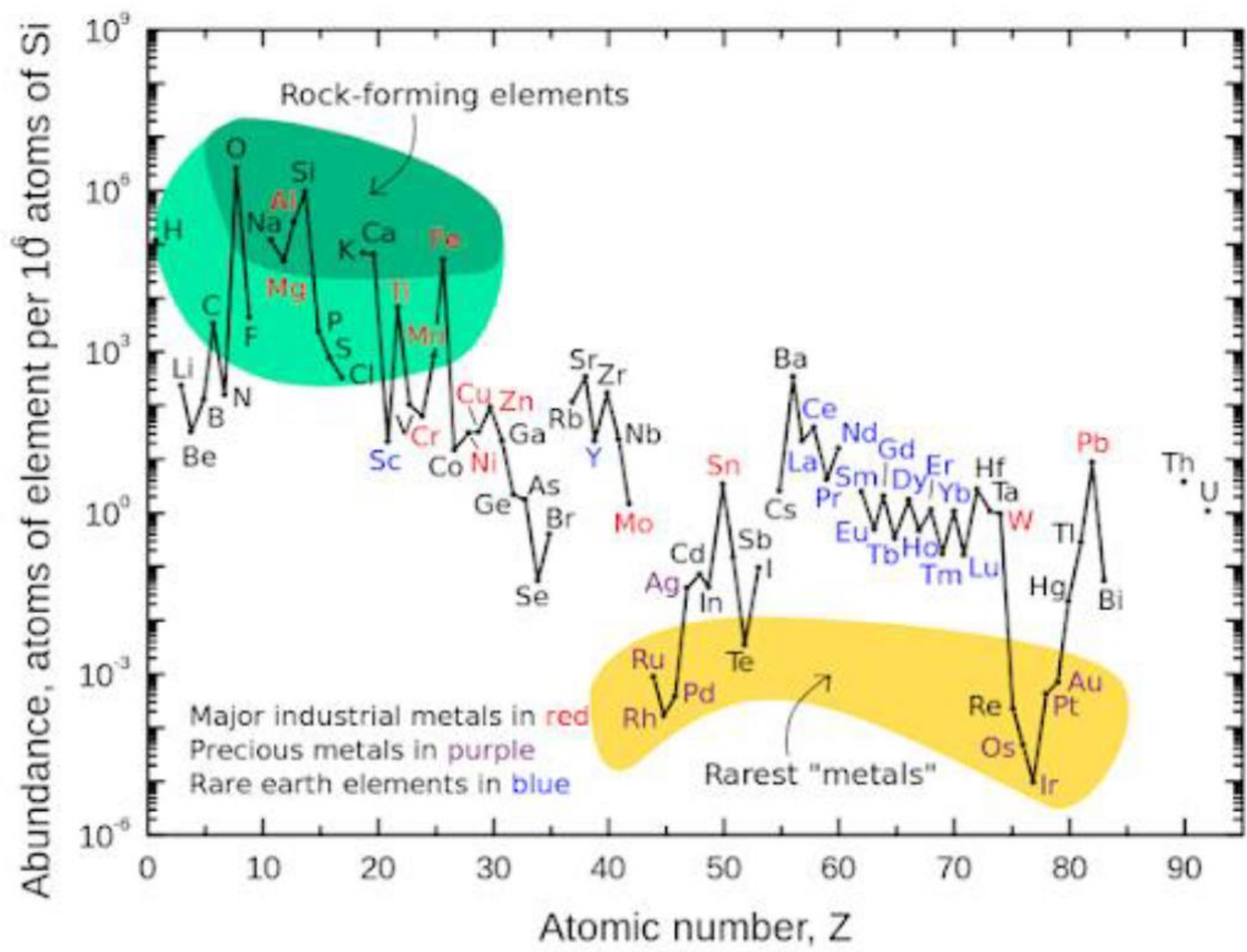


# Elementi del blocco f

<b>La</b>	<b>Ce</b>	<b>Pr</b>	<b>Nd</b>	<b>Pm</b>	<b>Sm</b>	<b>Eu</b>	<b>Gd</b>	<b>Tb</b>	<b>Dy</b>	<b>Ho</b>	<b>Er</b>	<b>Tm</b>	<b>Yb</b>	<b>Lu</b>	<b>Hf</b>
<b>Ac</b>	<b>Th</b>	<b>Pa</b>	<b>U</b>	<b>Np</b>	<b>Pu</b>	<b>Am</b>	<b>Cm</b>	<b>Bk</b>	<b>Cf</b>	<b>Es</b>	<b>Fm</b>	<b>Md</b>	<b>No</b>	<b>Lr</b>	<b>Rf</b>

Lantanide generico = Ln, [Xe]4f<sup>n</sup>6s<sup>2</sup>

Attinide generico = An, [Rn]5f<sup>n</sup>7s<sup>2</sup>





### Magnetics

Nd Tb, Dy Pr

- Computer Hard Drives
- Disk Drive Motors
- Anti-Lock Brakes
- Automotive Parts
- Frictionless Bearings
- Magnetic Refrigeration
- Microwave Power Tubes
- Power Generation
- Microphones & Speakers
- Communication Systems
- MRI

CREOs

HREOs

LREOs



### Phosphors

Nd, Eu, Tb, Y Er, Gd Ce, Pr

- Display phosphors - CRT, LPD, LCD
- Fluorescent Lighting
- Medical Imaging
- Lasers
- Fibre Optics



### Ceramics

Nd, Y, Eu Gd, Lu, Dy La, Ce, Pr

- Capacitors
- Sensors
- Colorants
- Scintillators
- Refractories



### Metal Alloys

Nd, Y La, Ce, Pr

- NimH Batteries
- Fuel Cells
- Steel
- Super Alloys
- Aluminium / Magnesium



### Glass & Polishing

Nd Gd, Er, Ho La, Ce, Pr

- Polishing Compounds
- Pigments & Coatings
- UV Resistant Glass
- Photo-Optical Glass
- X-Ray Imaging



### Catalysts

Nd La, Ce, Pr

- Petroleum Refining
- Catalytic Converter
- Fuel Additives
- Chemical Processing
- Air Pollution Controls

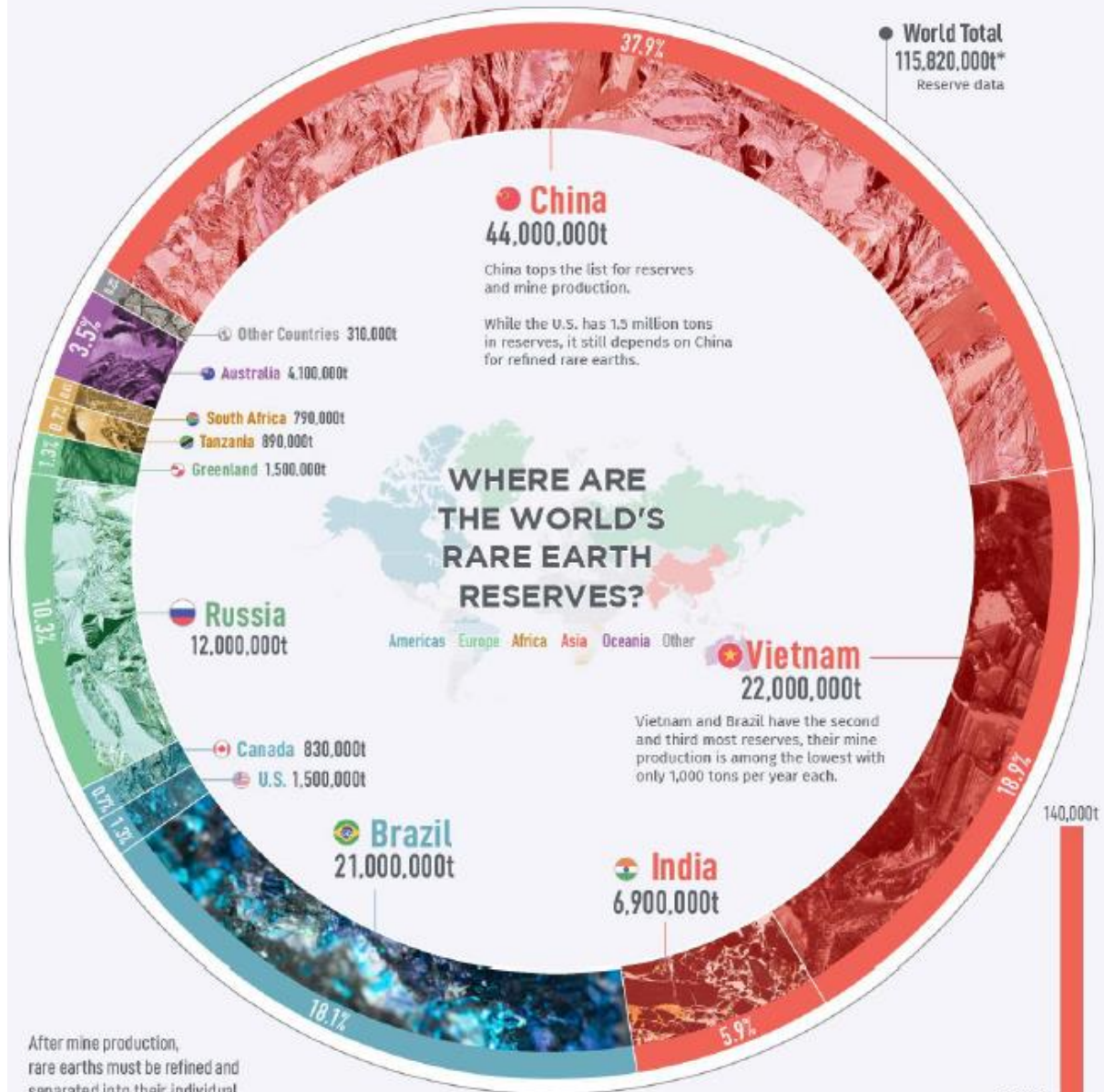


### Defense

Nd, Eu, Tb, Dy, Y Lu, Sm Pr, La


- Satellite Communications
- Guidance Systems
- Aircraft Structures
- Fly-by-Wire
- Smart Missiles





After mine production, rare earths must be refined and separated into their individual metals for their particular uses.

**Uses:**

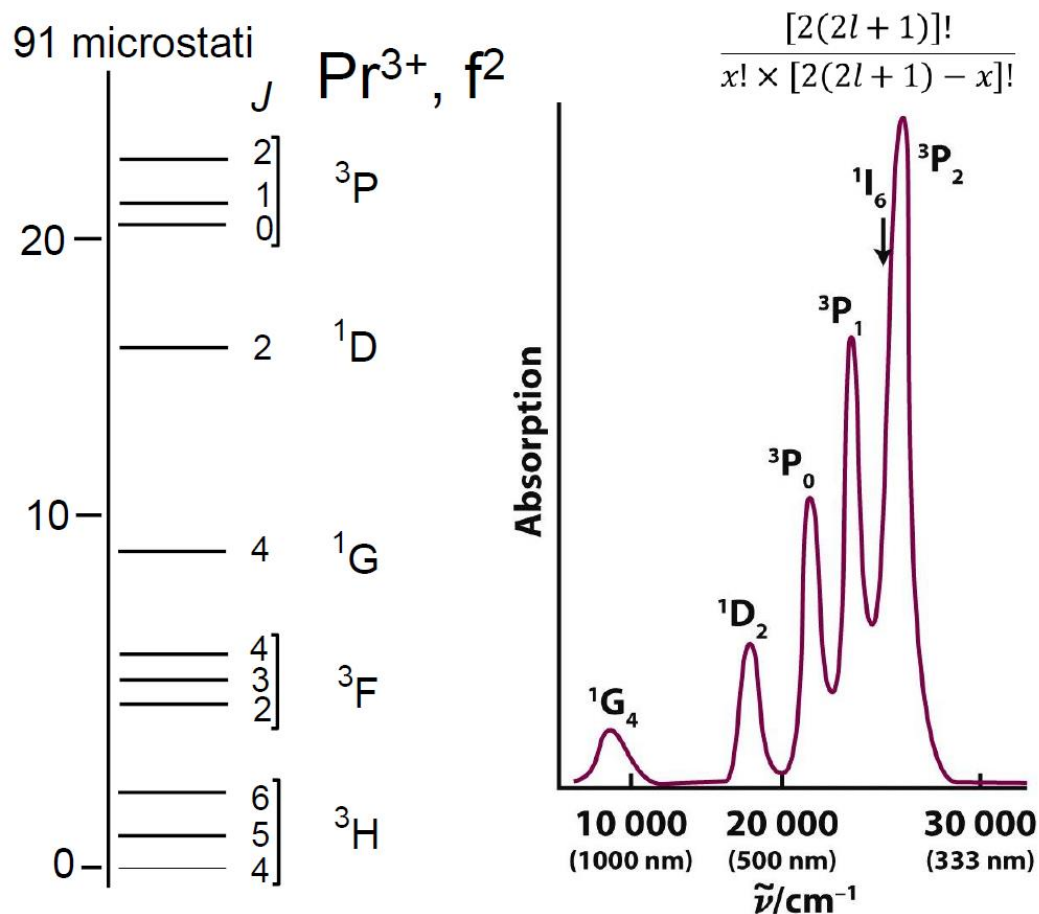
-   
Magnets
-   
Lights
-   
Screens
-   
Glass
-   
Catalysts
-   
Batteries
-   
Steel Alloys

**Mine Production 2020**



# Caratteristiche degli spettri UV-Vis. dei complessi dei lantanidi

- **Numero elevato di assorbimenti** a causa del gran numero di microstati.



## Caratteristiche degli spettri UV-Vis. dei complessi dei lantanidi

- **Numero elevato di assorbimenti** a causa del gran numero di microstati.
- **Assorbimenti deboli** a causa della mancanza di mescolamento fra gli orbitali (transizioni proibite). I coefficienti di assorbanza molare ( $\epsilon$ ) valgono tipicamente  $1 - 10 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ ; in confronto, quelli dei metalli d sono prossimi a  $100 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ .
- **Bande affilate** a causa delle deboli interazioni degli orbitali f con le vibrazioni dei leganti.
- Spettri in larga parte **indipendenti dalla natura dei leganti e dal numero di coordinazione.**

# Luminescenza

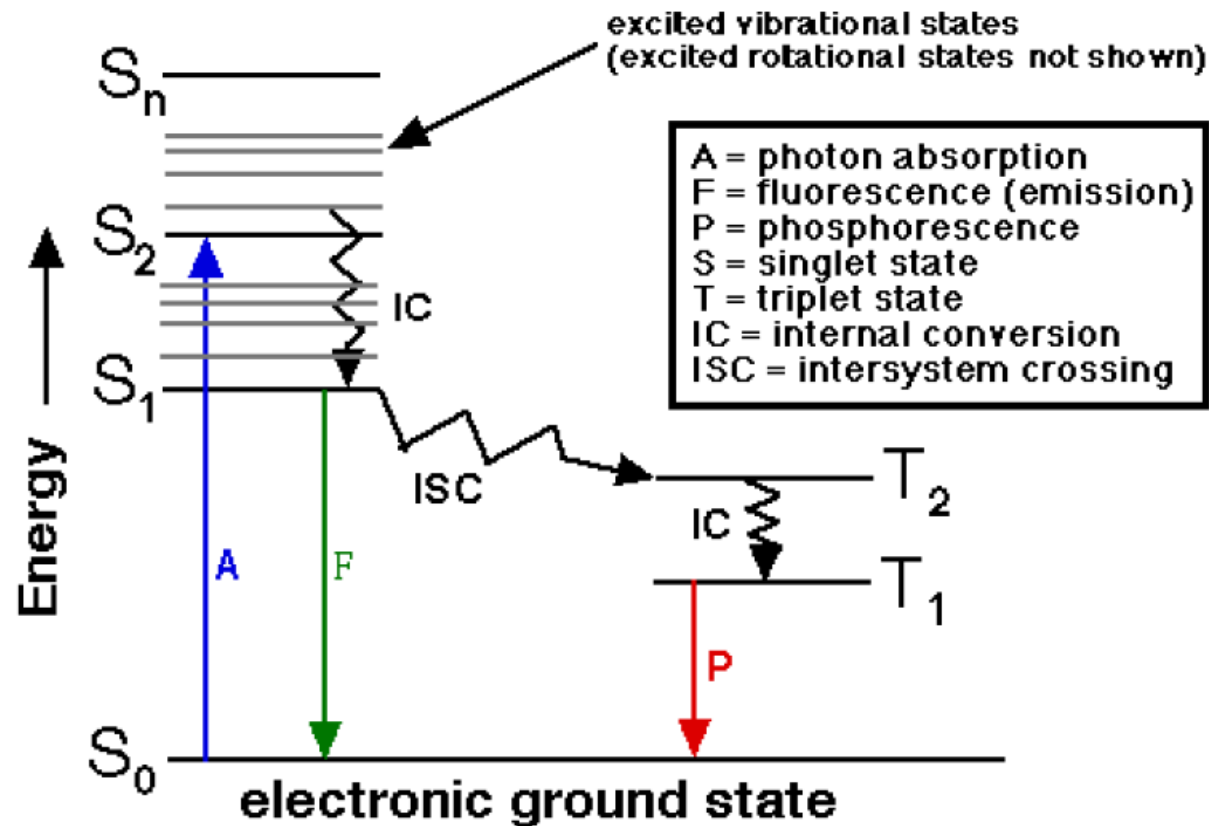
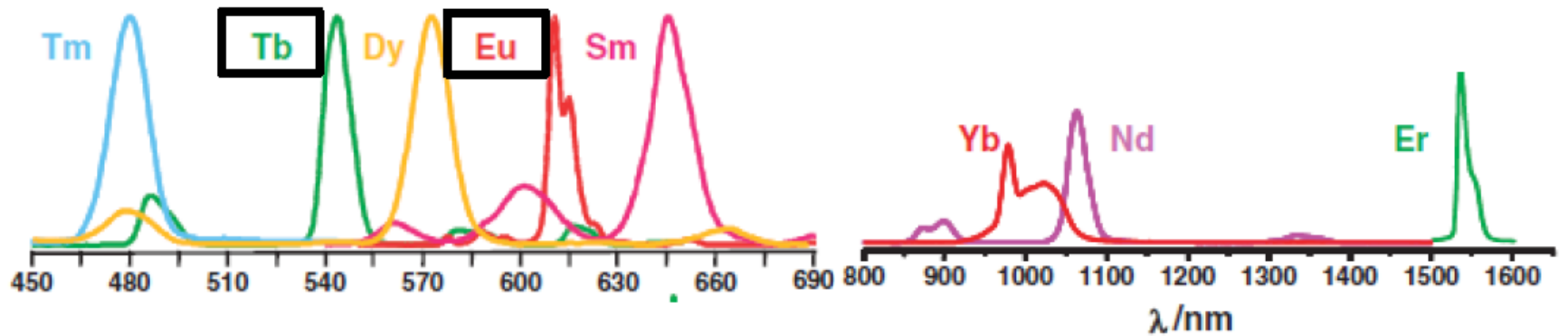


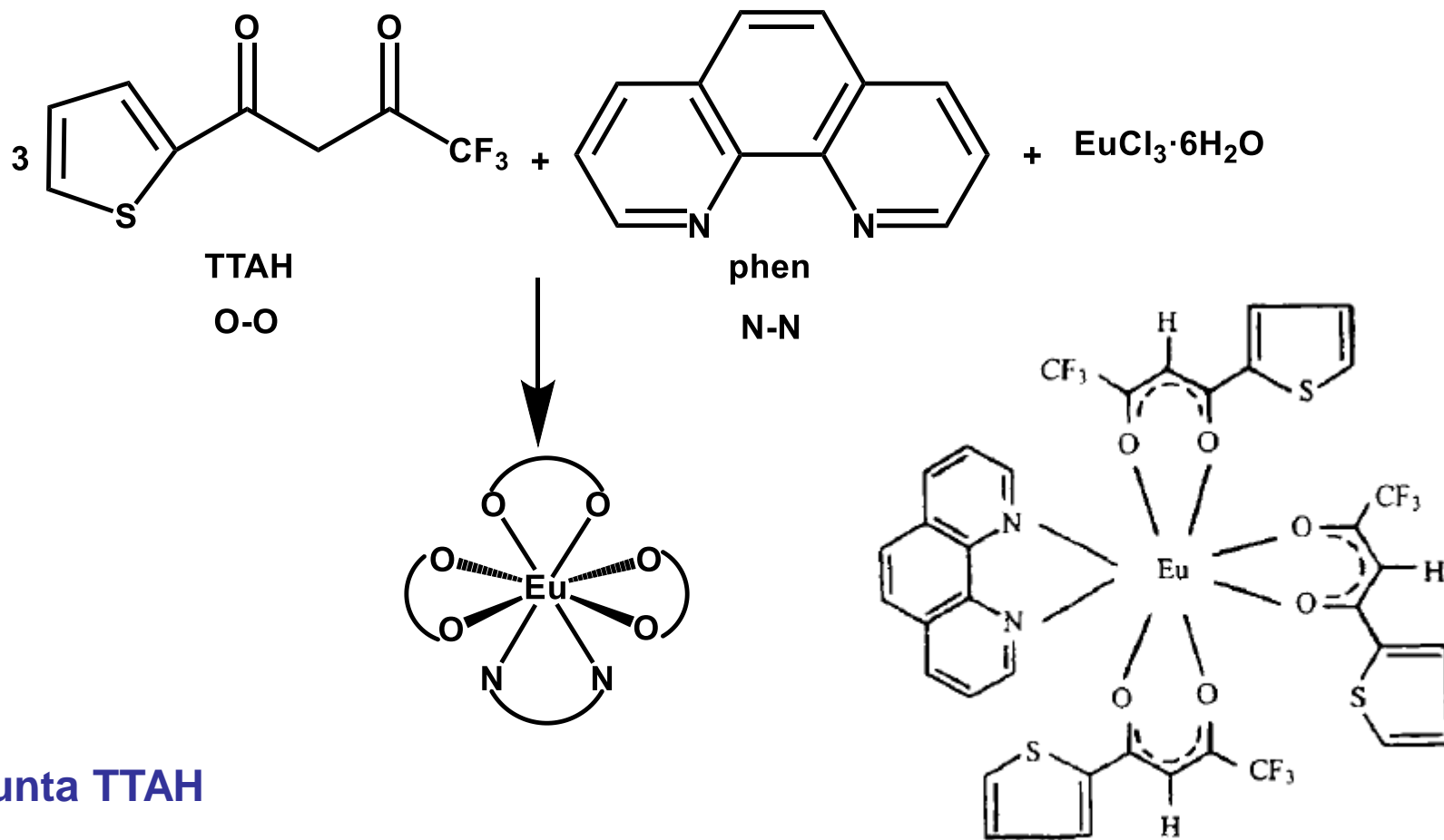
Diagramma di Jablonski



# Spettri di emissione degli ioni $\text{Ln}^{3+}$

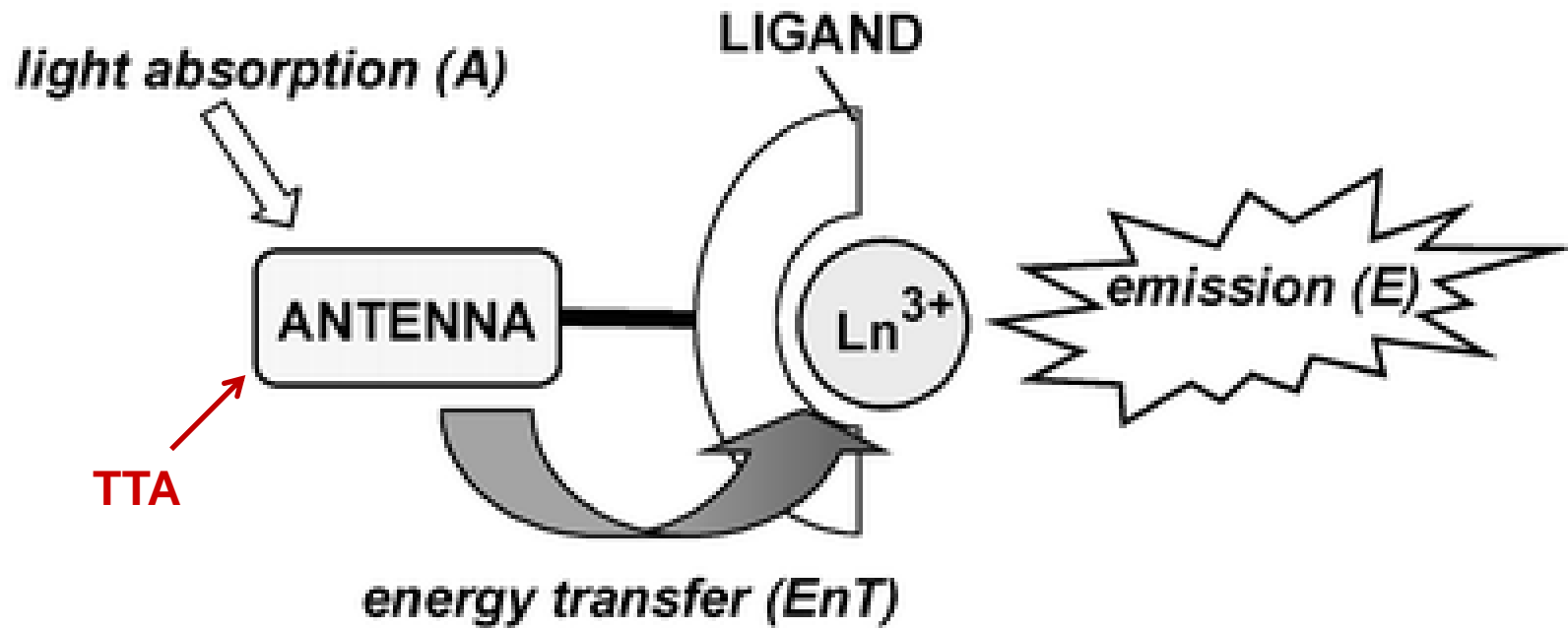


**ESPERIENZA 5**  
**SINTESI DI UN COMPLESSO LUMINESCENTE:**  
**[Eu(TTA)<sub>3</sub>(phen)]**



- Aggiunta TTAH
- pH basico (aggiunta NaOH)
- Aggiunta phen

# Sensibilizzazione (*antenna excitation*)



# Sensibilizzazione (*antenna excitation*)

