

# Lecture on Fluorescence and Plasmonics

## Supplementary Study Guide

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**Introduction to Fluorescence** (8:11): <https://www.youtube.com/watch?v=SGFlr1jFNBM>

- Fluorophores
- Energy states
- Wavelengths and frequencies
- Excitation and emission
- Quenching and photobleaching

**Fluorescence Spectra** (3:11): <https://www.youtube.com/watch?v=oVxpaUfTuXI>

- Excitation/emission maximum
- Stokes shift and energy levels

**Jablonski Diagram:**

[https://chem.libretexts.org/Bookshelves/Physical\\_and\\_Theoretical\\_Chemistry\\_Textbook\\_Maps/Supplemental\\_Modules\\_\(Physical\\_and\\_Theoretical\\_Chemistry\)/Spectroscopy/Electronic Spectroscopy/Jablonski diagram](https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Spectroscopy/Electronic_Spectroscopy/Jablonski_diagram)

- Molecular absorbance/emission of light
- Electronic energy state transitions
- Radiative and non-radiative processes
- Transition timescales

**Förster Resonance Energy Transfer (FRET):**

[https://chem.libretexts.org/Bookshelves/Physical\\_and\\_Theoretical\\_Chemistry\\_Textbook\\_Maps/Supplemental\\_Modules\\_\(Physical\\_and\\_Theoretical\\_Chemistry\)/Fundamentals/Fluorescence Resonance Energy Transfer](https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Fundamentals/Fluorescence_Resonance_Energy_Transfer)

- Donor/acceptor chromophore pair
- Nonradiative dipole-dipole coupling
- Distance dependence (< 10 nm)
- Spectral overlap
- Energy transfer efficiency

**Fluorescence Microscopy** (33:34): <https://www.youtube.com/watch?v=AhzhOzgYoqw> & <https://www.olympus-lifescience.com/en/microscope-resource/primer/techniques/confocal/fluorophoresintro/>

**FRET Microscopy** (36:10): <https://www.youtube.com/watch?v=nba4QwROBtA>, <https://www.olympus-lifescience.com/en/microscope-resource/primer/techniques/fluorescence/fret/fretintro/>

**Fluorescent Probes** (20:47): <https://www.youtube.com/watch?v=gSGq8gOLXwY&list=PLQFc-Dxlf4pSHREZvz41xHFSEp65iNkBL&index=31> &

<https://www.thermofisher.com/us/en/home/references/molecular-probes-the-handbook.html>

Fluorophore structures

Quantum dots

Probe attachment chemistry

**Introduction to Plasmonics** (11:45): <https://www.youtube.com/watch?v=8iyShOidtYg>

Light-matter interactions

Metallic nanoparticles

Electromagnetic enhancement

**Plasmonics Applications** (11:05): [https://www.youtube.com/watch?v=iUyPssG9f\\_M](https://www.youtube.com/watch?v=iUyPssG9f_M)

Raman spectroscopy

Biochemical sensing

Solar cells and dynamic display