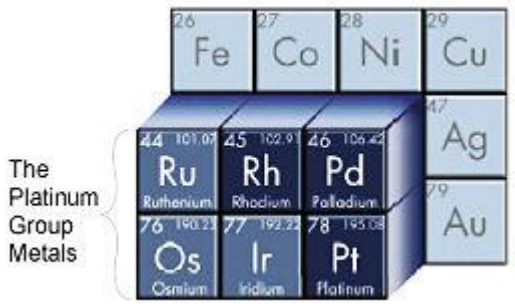
ACHILLES GAROUFIS

SYNTHESIS AND CHARACTERIZATION OF PLATINUM GROUP METAL COMPOUNDS



simple organometallic compounds or metal complexes

CONJUGATION WITH SMALL PEPTIDES AND OTHER BIOMOLECULES (chimeric compounds)

CONJUGATION WITH OLIGO p-PHENYLENES AND OLIGO PYRYDINES

PROPERTIES

- **Bioactivity, (selective chemical nucleases)**
- **Cytotoxicity (anticancer compounds)**
- **Homogenous catalysis**
- **On-off fluorescence switches**
- **DNA probes (DNA binders)**

SELF-ASSEMBLY IN SOLUTION (nano-aggregates)

ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

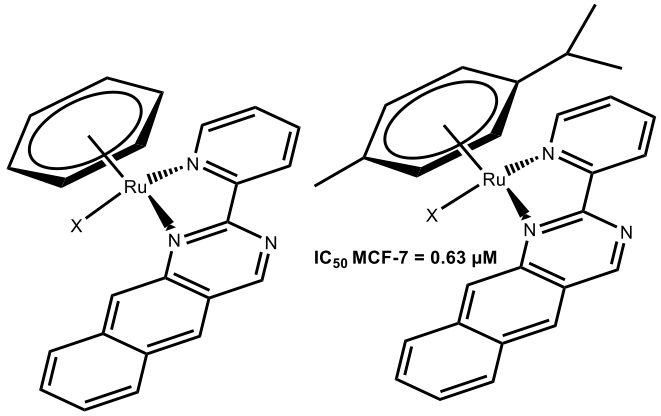
Synthesis and characterization of simple organometallic compounds or metal complexes of PGM's

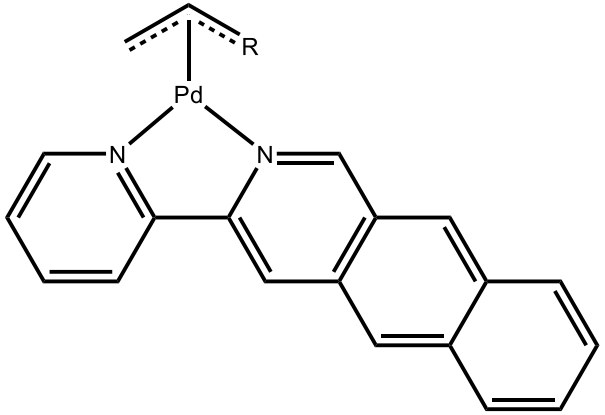
1. Standard Synthetic laboratory equipment and special for air sensitive compounds (vacuum Schlenk line, Glove bag, solvent distillation system, dry oven etc.)
2. Characterization in solution:

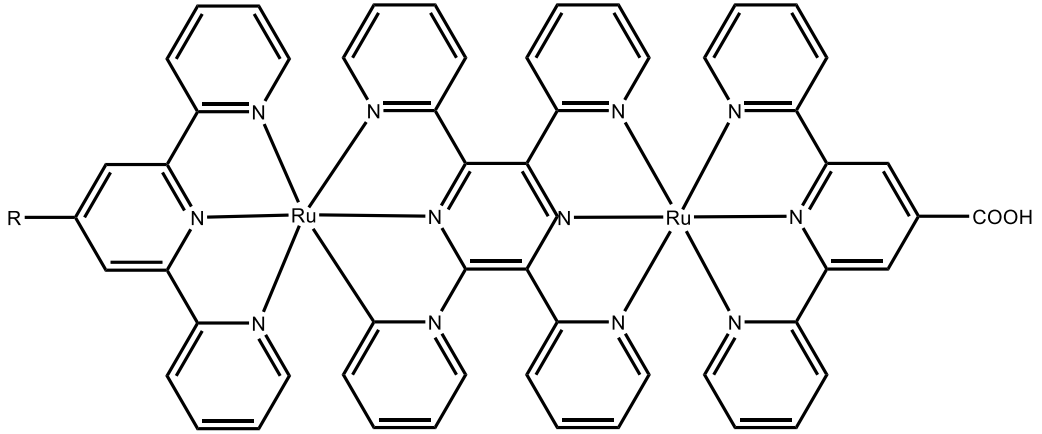
- standard NMR multinuclear techniques (^{1}H, ^{13}C, ^{195}Pt, etc.) and multidimensional (COSY TOCSY HMBC, HSQC etc)
- high resolution ESI MS spectrometry

3. Characterization in solid state:

- X-Ray single crystal methods







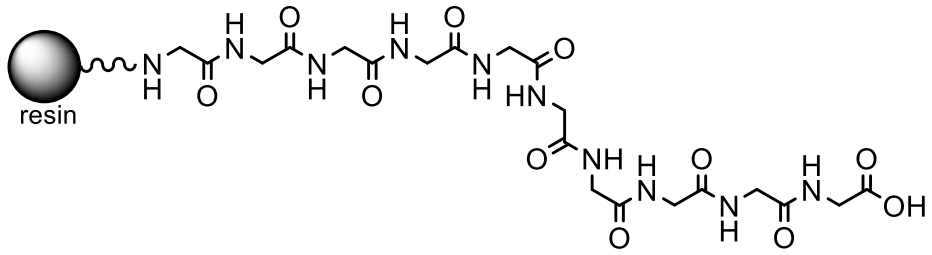
SYNTHESIS

ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

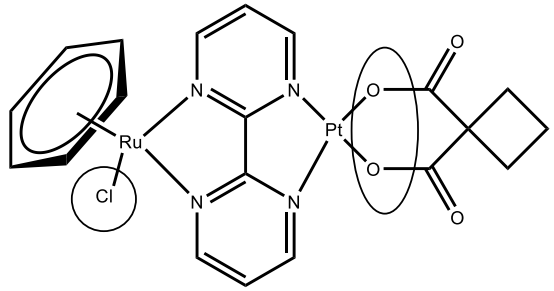
CONJUGATION WITH SMALL PEPTIDES AND OTHER BIOMOLECULES (chimeric compounds)

SYNTHESIS

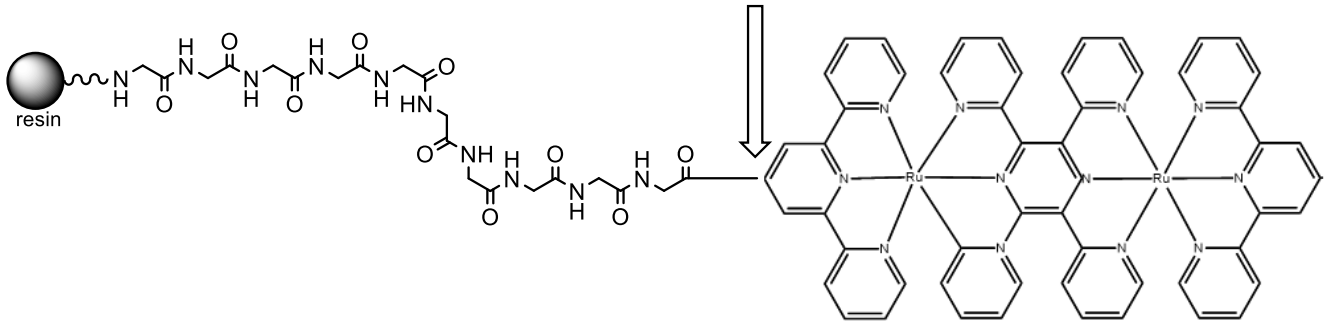
Solid-state peptide synthesis



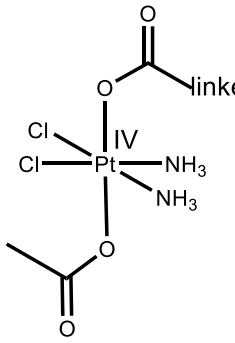
Binuclear heterometallic compounds



Conjugation with peptide bond



GLIOPLATIN



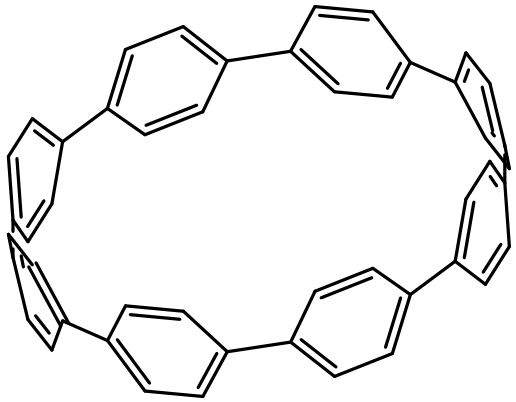
Thr-Thr-Pro-Ile(Val)-Glu-Glu-Thr-Gln

fn-14

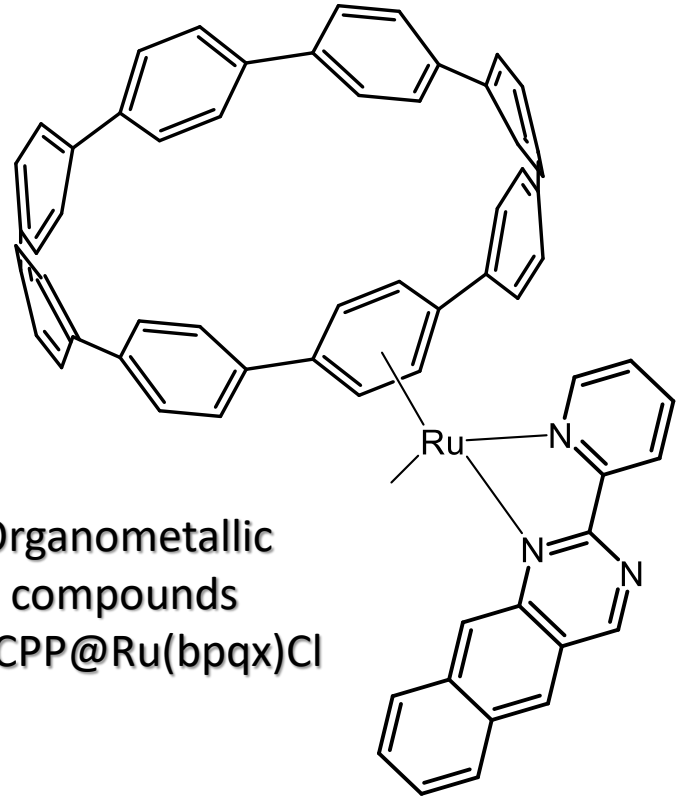
incorporation to poly-Glu and poly-(Glu-co-Lys) micelles

ΙΝΣΤΙΤΟΥΤΟ ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

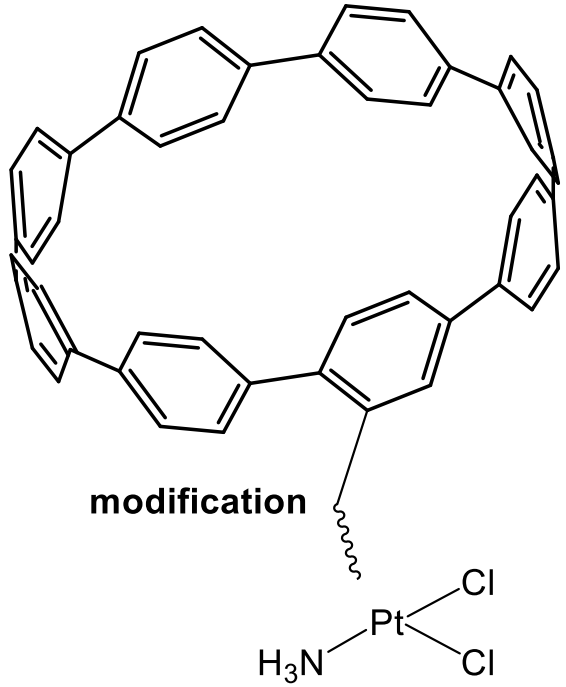
CONJUGATION WITH OLIGO p-PHENYLENES AND OLIGO PYRYDINES (Nano-hoops)



CyclicPolyPhenylene
[8]CPP, [i]CPP

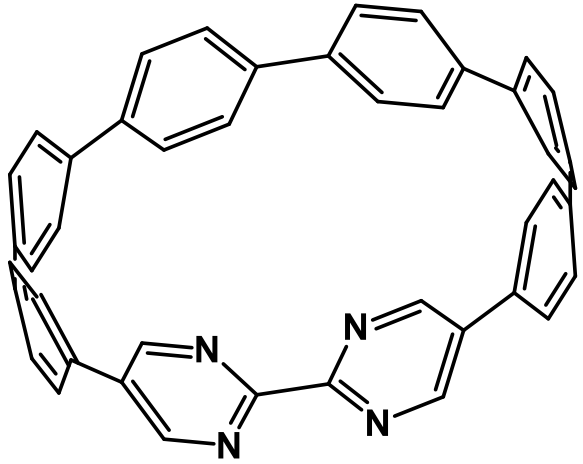


Organometallic
compounds
[8]CPP@Ru(bpqx)Cl

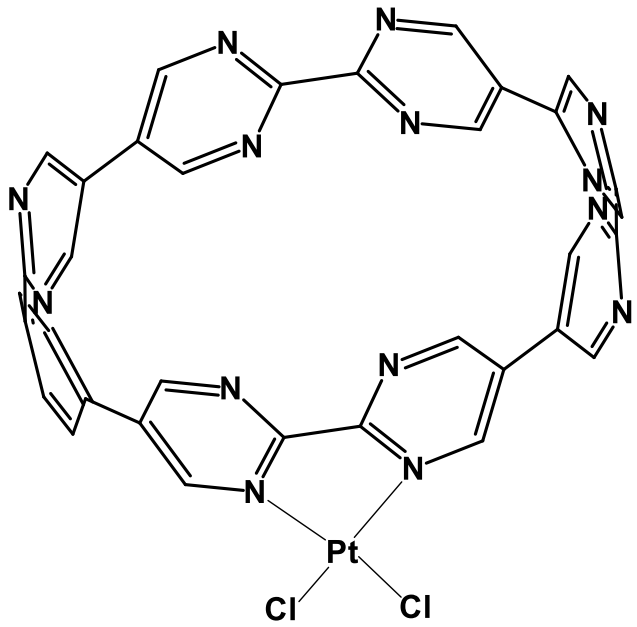


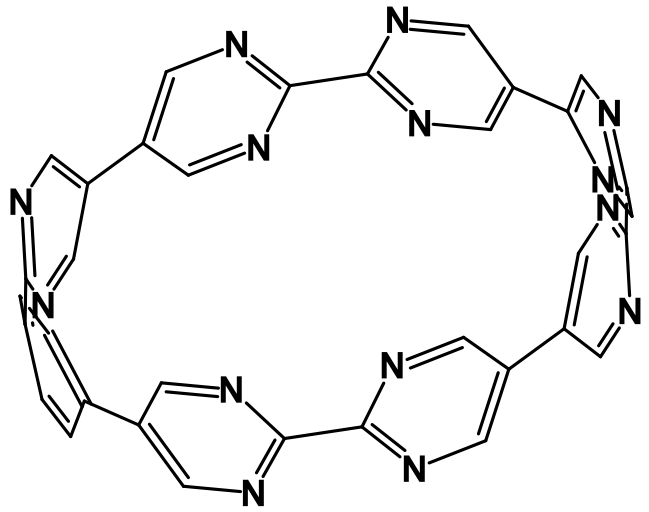
SYNTHESIS

Synthesis of novel pyrimidine-based nano-hoops

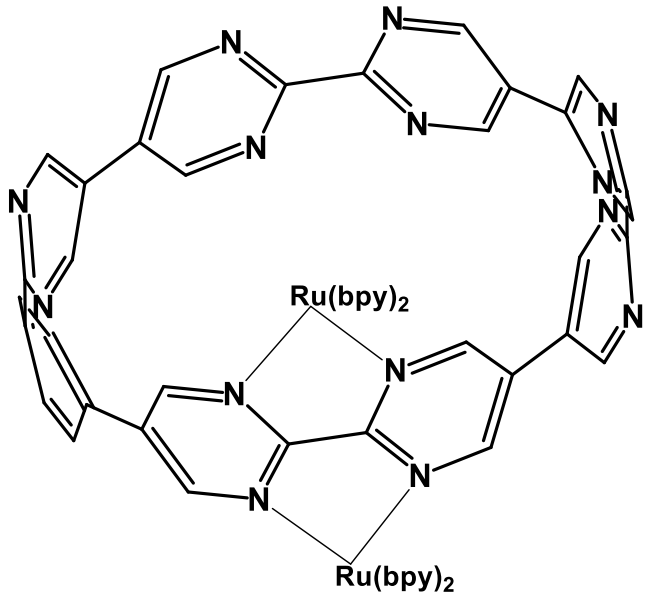


[8]CP@(1)bpm





[8]CPm

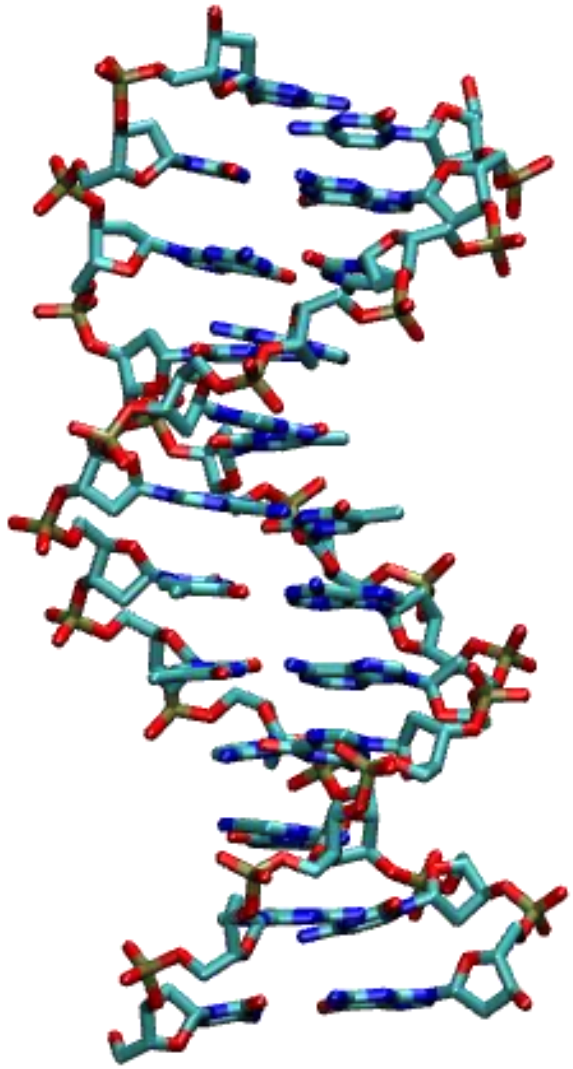


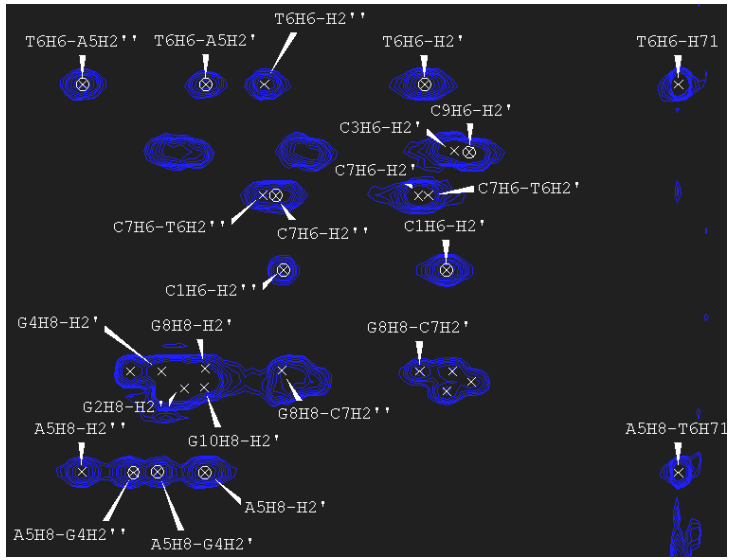
ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

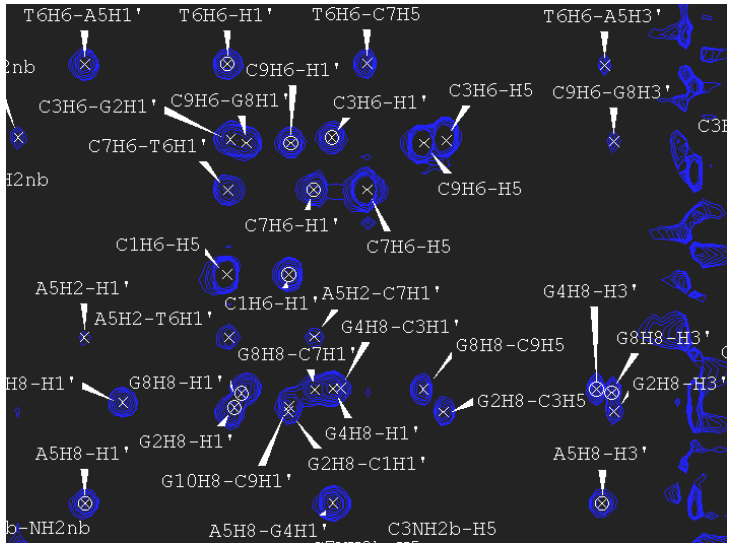
SYNTHESIS

PROPERTIES

- **Bioactivity, (selective chemical nucleases)**
- **Cytotoxicity (anticancer compounds)**
- **Homogenous catalysis**
- **On-off fluorescence switches**
- **DNA probes (DNA binders)**







Bioactivity - DNA binders

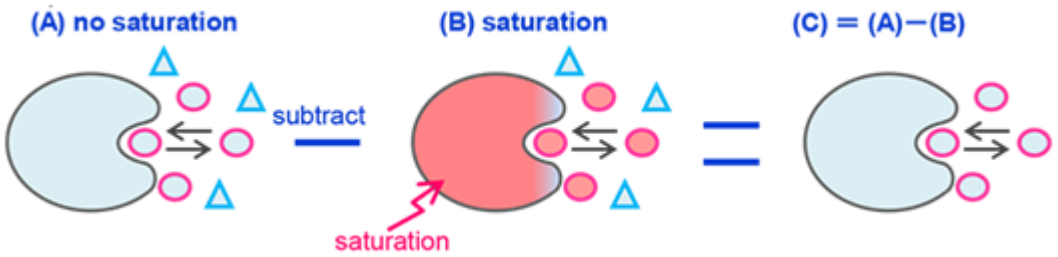
- Self-complementary oligonucleotides e.g. the dodecamer 5’-CGCGAATTCGCG-3’ in duplex.
- **NOESY** NMR spectroscopy
- Gel-electrophoresis
- **STD** NMR specroscopy

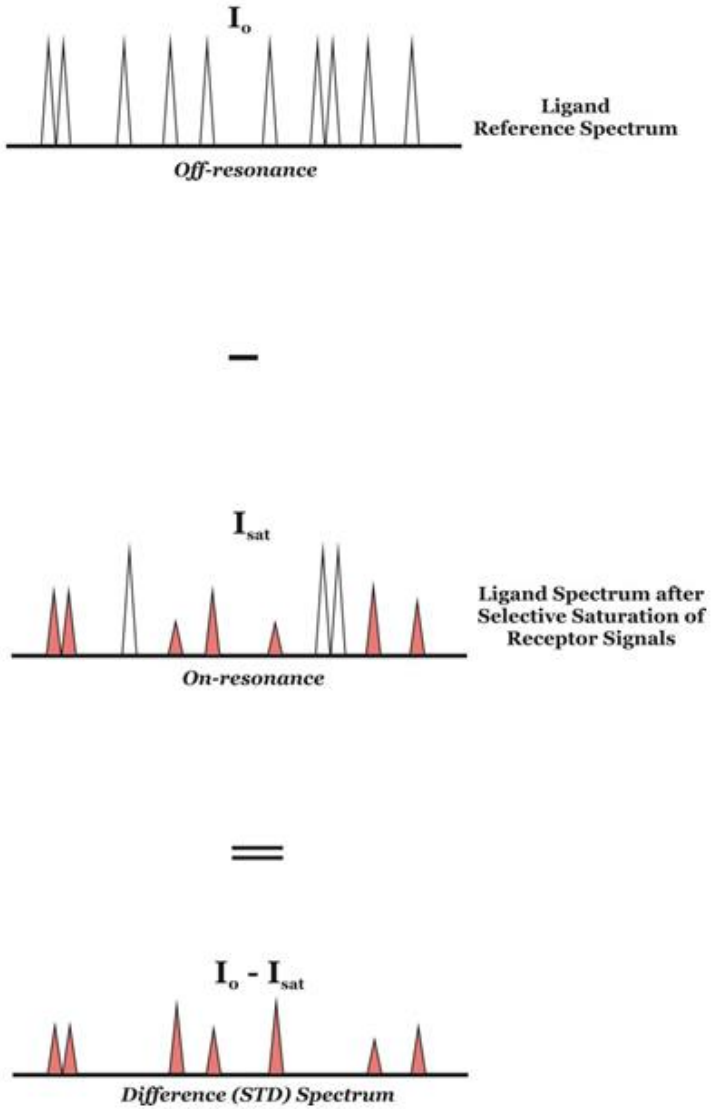
$$r = (c/V_{crosspeak})^{1/6}$$

ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

PROPERTIES

Saturation-Transfer Difference (STD) NMR





Cytotoxicity

- MTT (IC_{50})
- Other methods

Chemical Nucleases (artificial nucleases)

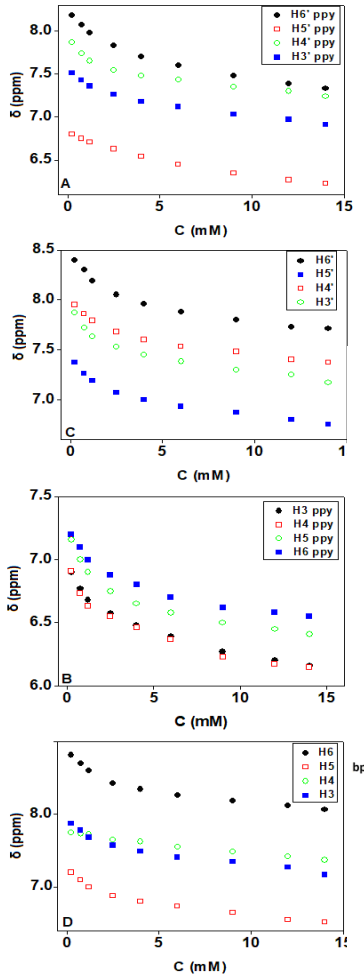
- Gel-electrophoresis
- ESI-MS

PROPERTIES

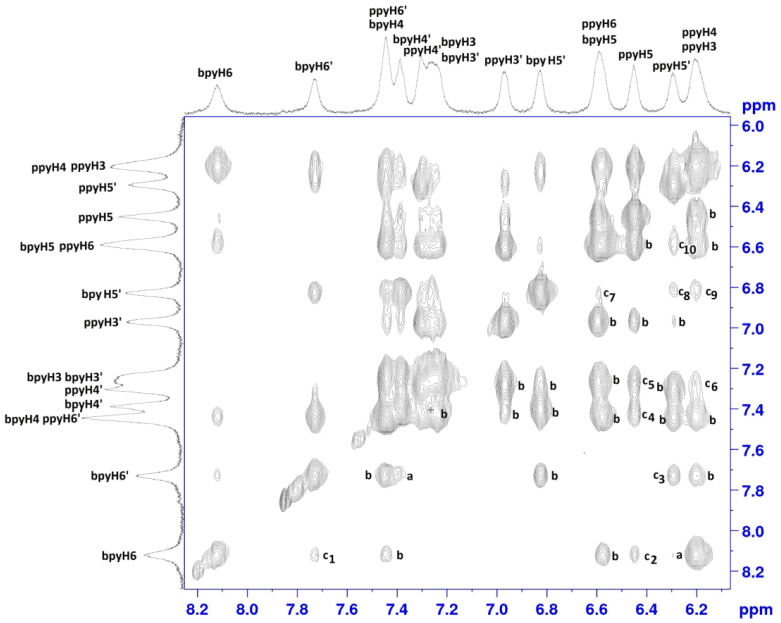
ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

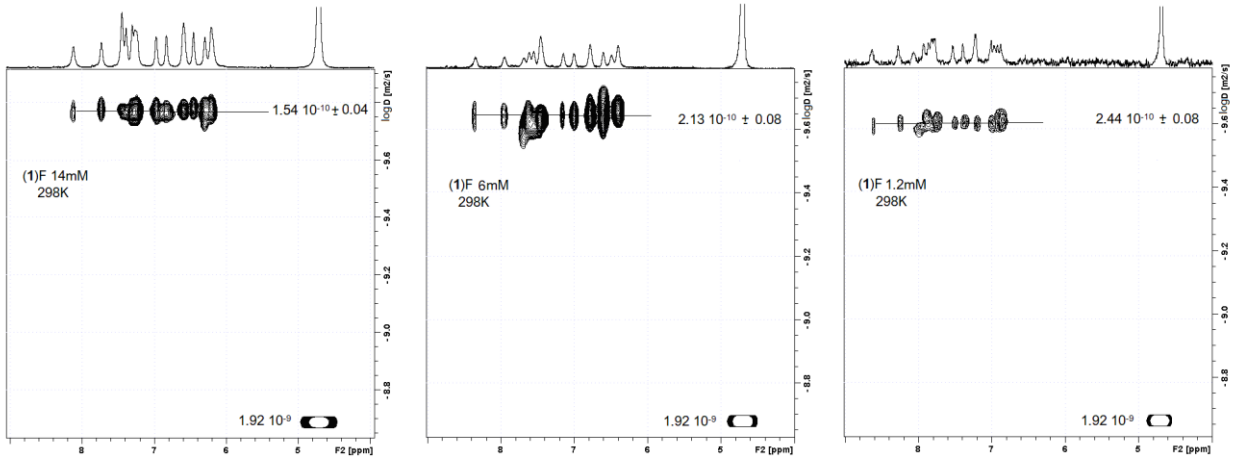
SELF-ASSEMBLY IN SOLUTION - HYDROPHOBIC INTERACTIONS
(nano-aggregates)

- Ion-pairing of small organometallic compounds
- Soluble in aqueous media
- Nano-aggregates depending on concentration (C_m)
- Switch-on-off fluorescence



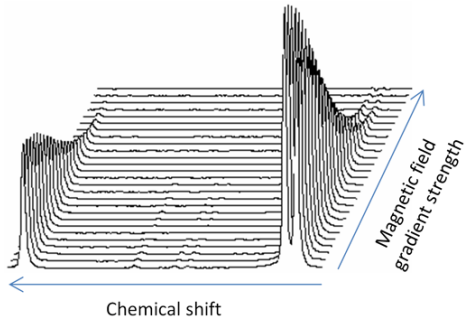
NOESY NMR
π-π interactions





DOSY NMR
(*pseudo 2D-NMR*)

- diffusion coefficients D_{obs}
- hydrodynamic radius r_H
- aggregation number N



$$r = \frac{kT}{6\pi\eta D}$$

ΙΝΣΤΙΤΟΥΤΟ
ΕΠΙΣΤΗΜΗΣ ΥΛΙΚΩΝ
ΚΑΙ ΥΠΟΛΟΓΙΣΜΩΝ

PROPERTIES