

Pt(IV) complexes with thiourea derivatives as ligands: looking for their bonding scheme

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Over the last three decades, there has been increasing interest in platinum complexes with *N,S*-donor ligands as thiourea derivatives. Such complexes may exhibit either higher anticancer activity or reduced toxicity compared to known metal containing drugs, such as cisplatin¹. Therefore, a series of platinum complexes containing thiourea moieties in their structure was synthesized and their cytotoxicity was assessed. The novel complexes show high activity ($IC_{50} \leq 10 \mu M$) against human primary colon cancer (SW620) and human breast cancer (MDA-MB-231), while showing no toxicity towards the normal cell line.

The synthesized compounds have been structurally characterized. The ratio of metal cation to ligand is 1:1 and the presence of chloride anions (derived from the salt used for synthesis) in their structure is observed. Their UV-Vis spectra are typical for platinum compounds in the +4 oxidation state. A comparison of S K-edge XANES spectra shape (Fig. 1a) indicates the coordination of the S atom to the metal cation. The shift of the bands, in the ATR-IR spectra, corresponding to the vibrations of the C=S group within the ligand-complex pair confirms that ligand coordinate to Pt(IV) via S atom of thiourea moiety. The analysis of Pt L3-edge EXAFS spectra for representative complex (Fig. 1b) revealed four Cl anions (from inorganic salt) and two S atoms (from organic ligand) around Pt(IV) cation.

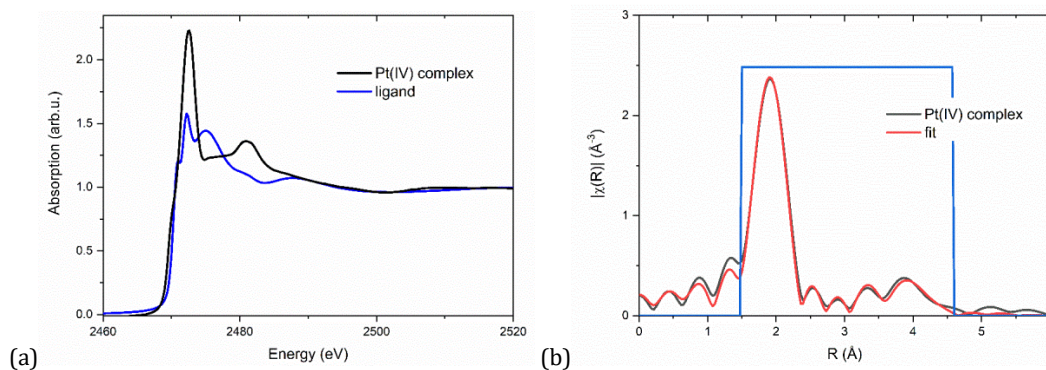


Figure 1 (a) Comparison of S K-edge XANES spectra for representative thiourea ligand–Pt(IV) complex pair; (b) EXAFS fitting of the experimental oscillations (black line) and the fitting result (red line).

The final step was to determine the molecular structure of the new compounds and correlate it with their biological activity.

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References

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