Most ferrocene derivatives show excellent stability towards water and air and have favorable electrochemical properties. Therefore they find a variety of applications, e.g. in molecular receptors, sensor devices with electrochemical detection or labeling of biomolecules. The introduction of non natural ferrocene based amino acids into peptides may lead to novel biomaterials capable of folding like natural proteins and even with additional properties such as conductivity or magnetism.

The key building block is the non natural amino acid 1-amino-1´-carboxy-ferrrocene. Peptide coupling of two ferrocene moieties proceeds easily via benzo-triazole activation leading to the diferrocenyl-diamide-complex 1. The aggregation of 1 in the solid state was shown by X-ray crystallography (Figure A) and FT-IR spectroscopy. The dynamic folding in solution (Figure B) was analyzed by VT-¹H NMR and FT-IR spectroscopy as well as DFT-calculations.¹¹

The diferrocenyl-diamide 1 binds chloride with its two amide groups with concomitant opening of the binding pocket as shown by ¹H NMR and FT-IR spectroscopy as well as DFT calculations. Cyclic voltammetric investigations demonstrate that 1 is capable of electrochemical anion recognition.²²

REFERENCES: