

Redox Conduction in 2D Bis(terpyridine)metal(II) Complex Polymers

(Research Institute for Science & Technology, Tokyo University of Science) ○Kenji Takada, Joe Komeda, Hiroshi Nishihara

Keywords: Terpyridines; Redox conduction; Coordination Polymers; Electrochemistry; Iron

Electron transport in thin films is a fundamental phenomenon and plays an important role in electronic/electrochemical devices. Coordination polymers woven up with metal-terpyridine coordination bonds are such polymers featuring robust redox reactions, expected for electrochemical catalysts and electrochromic materials. Previously, we demonstrated electrochromic 2D bis(terpyridine)iron(II) and cobalt(II) coordination polymers, **M-tpy** ($M = \text{Fe} \ \& \ \text{Co}$), with a three-armed terpyridine ligand.¹ For further understanding of electrochemical behaviors of the 2D polymer, here we report the results of potential-dependent conductivity measurements of **Fe-tpy** and **Co-tpy**, and give an explanation for electron transport through bis(terpyridine)iron(II) and cobalt(II) heterolayers (Fig.1).

Potential-dependent conductivity measurements were performed with interdigitated array microelectrodes (IDAs) in an Ar-filled glove box. The results indicated that the conductivity was at local maxima at the mixed-valence states. The conductivity-potential curves were well consistent with the expectations from the electron self-exchange theory, which confirms that redox conduction by electron hopping between $[\text{M}(\text{tpy})_2]$ units is dominant in **M-tpy**. By utilizing this electron transport mechanism, we demonstrate unique dissymmetric electron transport phenomena through **Fe-tpy/Co-tpy** vertical junctions which we have recently reported.²

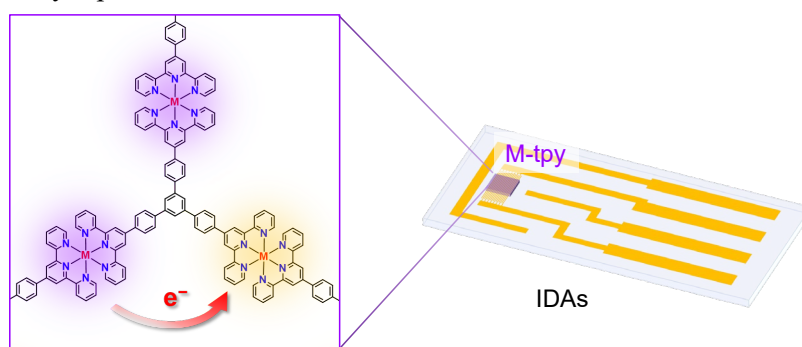


Fig. 1. Redox conductivity in **M-tpy** measured with IDAs.

1) K. Takada, R. Sakamoto, S.-T. Yi, S. Katagiri, T. Kambe, H. Nishihara, *J. Am. Chem. Soc.* **2015**, *137*, 4681-4689. 2) J. Komeda, K. Takada, H. Maeda, N. Fukui, T. Tsuji, H. Nishihara, *The 71st Conference of Japan Society of Coordination Chemistry*, **2021**, 3Aa-04.