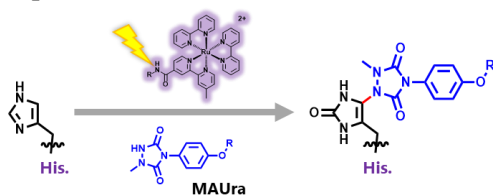


## Selective photo-labelling of G4 DNA-binding protein

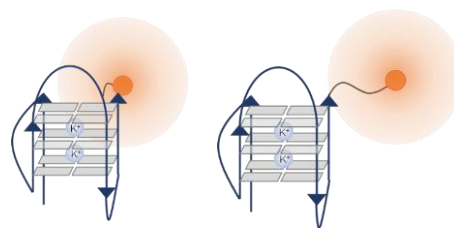
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**Keywords:** Photo-activable protein labelling, G-quadruplex (G4), G4-interacting proteins.

Interactions between proteins and nucleic acids are of vital importance in the regulation of numerous cellular processes, such as gene expression, DNA replication or DNA repair. Many methods to identify these interactions have been developed but robust methods that can interrogate transient and weak interaction networks are limited. In this study, we are attempting to identify not only the strong interactions, yet transient and weak interactions as well. We focused our research on G-quadruplex (G4) structure since it is found that endogenous DNA G4s enriched in terminal region of chromatin and promoters of highly expressed cancer genes. It is suggested that G4 structure functions may be intricately linked to their interacting proteins. Previously, tyrosine and histidine specific proximity labelling with 1-methyl-4-aryl-urazole (MAUra) has been reported using the photocatalyst, Ru complex (Fig. 1).<sup>1,2</sup> According to this knowledge, we designed an approach using Ru complex-modified G4 with the aim of G4-binding proteins labelling effectively and selectively. MAUra was used as a labelling reagent to achieve this goal. The Ru complex as the catalyst was conjugated at the middle or 5'-end of the HT G4-DNA sequence using NHS ester (Fig. 2). Using this method, G4-binding protein, UP1, was labelled efficiently and selectively in a mixture of UP1 and BSA. In addition, mass spectrometry suggested that only histidine of UP1 was labeled. All these results will elaborate in this presentation.



**Fig. 1.** Photo-mediated histidine labelling using Ru complex.



**Fig. 2.** Cat-modified G4 DNAs at the middle or 5'-end.

1) Sato, S., Nakamura, H., *et al.*, *Chem. Commun.* **2018**, 54, 5871-5874.

2) Nakane, K., Sato, S., Nakamura, H., *et al.*, *J. Am. Chem. Soc.* **2021**, 143, 7726-7731.