

JSPS第189委員会 日本におけるケミカルバイオロジーの新展開
令和元年第3回定例会 12. 19. 2019

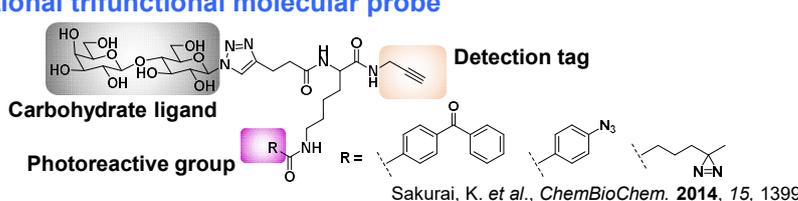
生物活性分子標的タンパク質探索に向けた
アフィニティプローブの新しいデザイン；
金ナノ粒子ラベリングプローブの開発

東京農工大学大学院工学研究院
櫻井香里




Development of gold nanoparticle-based multivalent photoaffinity probes

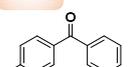
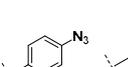
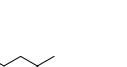
■ Conventional trifunctional molecular probe



Carbohydrate ligand

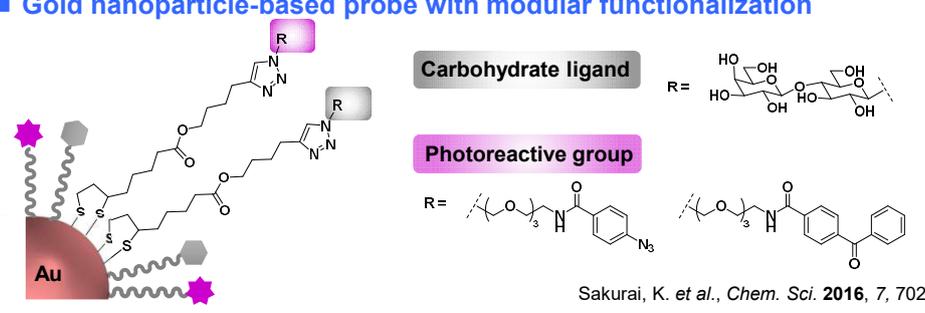
Photoreactive group

Detection tag

R =   

Sakurai, K. et al., *ChemBioChem*. 2014, 15, 1399.

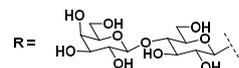
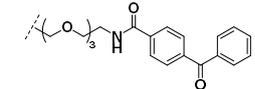
■ Gold nanoparticle-based probe with modular functionalization



Au

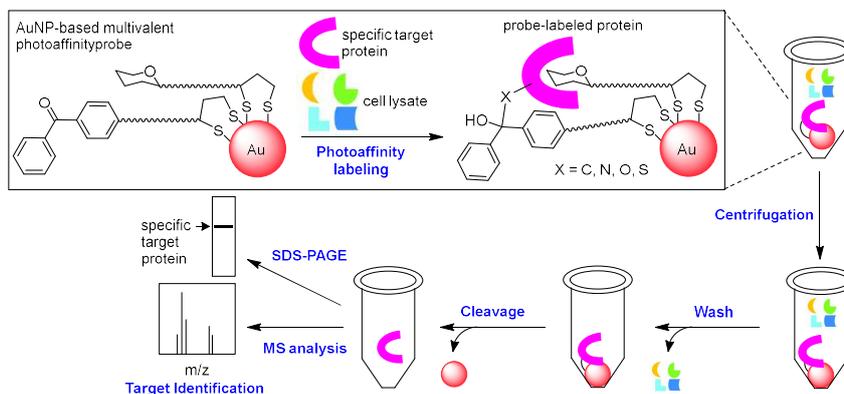
Carbohydrate ligand

Photoreactive group

R =  

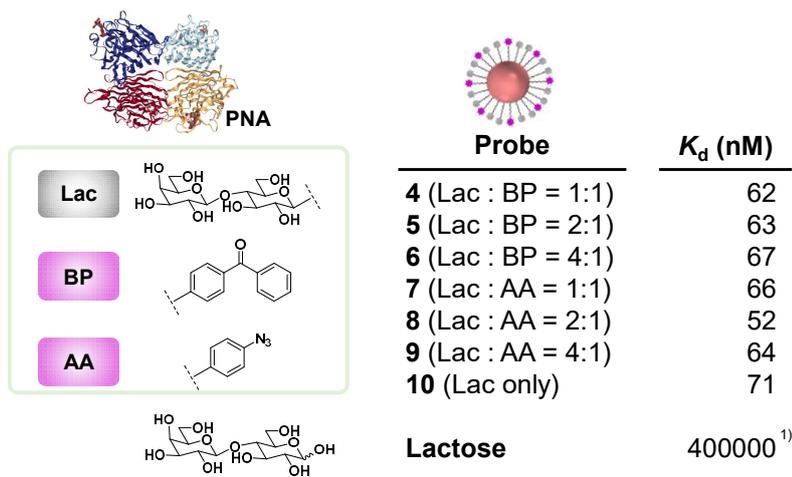
Sakurai, K. et al., *Chem. Sci.* 2016, 7, 702.

Streamlined approach to photoaffinity labeling by gold-nanoparticle probes



Sakurai, K. *et al.*, *Chem. Sci.* **2016**, *7*, 702

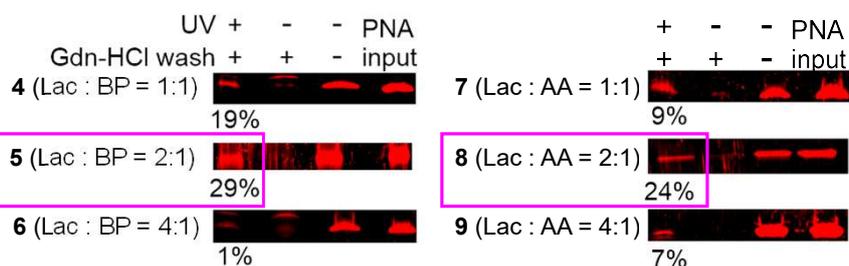
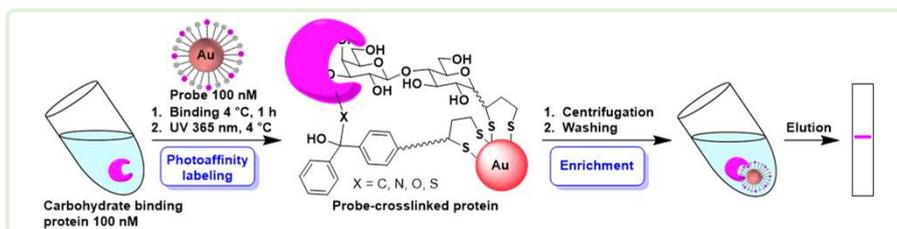
Affinity enhancement by multivalent presentation on gold nanoparticles



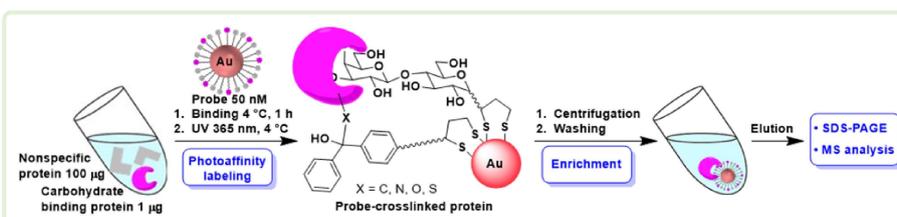
1) Cagnoni, J.A. *et al.* *Eur. J. Org. Chem.* **2013**, *5*, 972.

Sakurai, K. *et al.*, *Chem. Sci.* **2016**, *7*, 702

Reactivity of probes with different functional compositions



Selective photoaffinity labeling of carbohydrate binding proteins in cell lysate

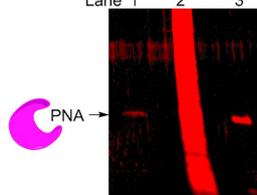


5 (Lac : BP = 2 : 1)
UV irradiation for 1 h

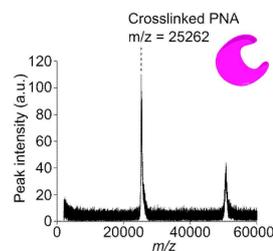
SDS-PAGE analysis

UV	PNA
+	control
-	control

Lane 1 2 3

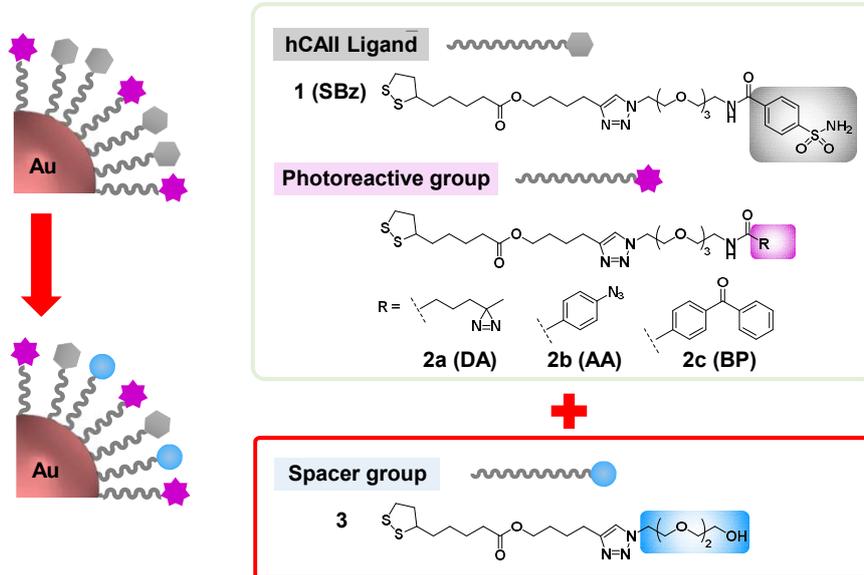


MALDI-MS analysis



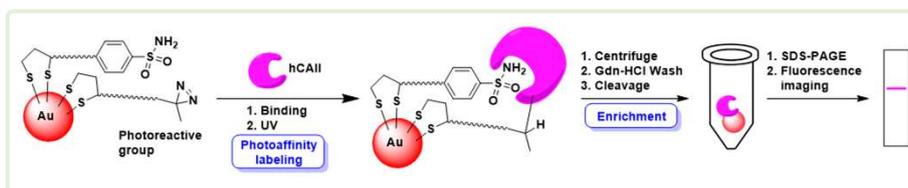
- Gold nanoparticle-based photoaffinity labeling is an effective approach to identifying low affinity carbohydrate binding proteins

Introducing Hydrophilic Spacer Group for Colloidal Stability



Sakurai, K. et al., *Bioorg. Med. Chem. Lett.* 2018, 28, 3227.

Effects of spacer group on the reactivity of nanoprobes



hCAII 1 μ g
Nanoprobe 1 nM
Binding 4 $^{\circ}$ C, 1 h
UV irradiation for 10 min

