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Preparation of sugar chain-immobilized fluorescent carbon nanoparticles

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Abstruct

Sugar chains play important roles in various biological events including cell-cell recognition, cell differentiation, proliferation, and pathogen infection. Since the functional analysis of sugar chain allows us to understand their biofunction, various analytical tools using sugar chain-immobilized nanodevices such as sugar chip and sugar chain-immobilized nanoparticles have been developed to date. In our group, sugar chain-immobilized fluorescent nanoparticles (SFNPs) have been developed as fluorescent probes for sugar chain-protein interaction analysis and cell imaging.[1,2] However, the core components of the SFNPs contain toxic/carcinogenic heavy metal ion such as cadmium and indium. In this study, for expanding versatility and reducing environmental burdens of SFNPs, we focused on fluorescent carbon nanoparticles (FCNPs) prepared from naturally abundant carbon materials, and addressed preparation of sugar chain-immobilized fluorescent carbon nanoparticles (SFCNPs).

Preparation of SFCNPs is shown in Figure 1. FCNPs were prepared from L-arginine according to the method previously reported.[3] L-Arginine was carbonized by heating at 400 °C for 2 hours. The carbonized arginine was oxidized with nitric acid under reflux conditions. Occurring carboxylic acid group of FCNPs was condensed with azide linker molecule. Conjugation of sugar moiety onto FCNPs was carried out by copper-free click reaction. Sugar moieties on SFCNPs were quantified by hexose quantification using anthrone-H_2SO_4. Binding properties of SFNCPs against proteins were investigated with lectins, sugar-binding proteins, and sugar-specific aggregates were obtained.

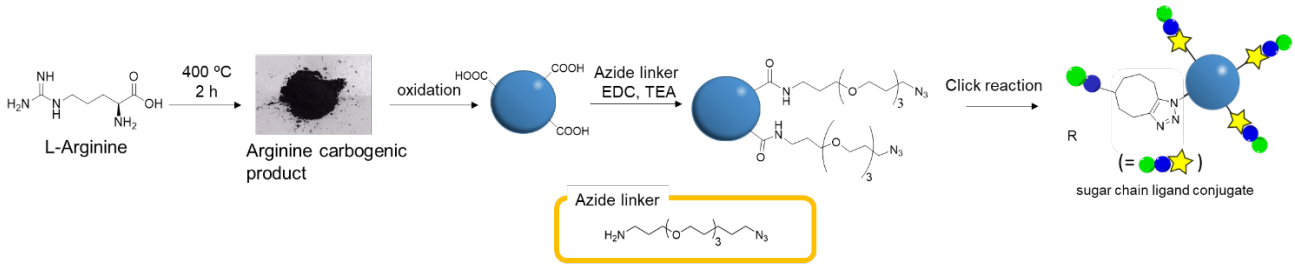

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Figure 1. Preparation of SFCNPs.

References

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3) Xu, Y. *et al.*, *Chem. Eur. J.*, (19), 2276-2283 (2013).

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