Sugar Chain Modified Graphene FET for Virus Detection

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In order to selectively detect the influenza virus, two types of the graphene FET, one is modified by the human type sugar chain, the other is modified by the birds sugar chain, are prepared as shown in Fig.1. For the purpose of the safety, the pseud influenza virus, such as Lectin was used.

The selective detection of the pseud human influenza virus was performed by graphene FET. The SSA is the Lectin for the pseud human influenza virus, the MAM for the pseud bird influenza virus. The pseud human influenza virus can be selectively caught by the human-type sugar chain and modified the current of the graphene FET, that means the selective detection of the pseud human influenza virus.

When virus released from the cell to another cell and continues the infection, neuraminidase of the virus tip dissolves the sialic acid of the sugar chain where the hemagglutinin is attached. There was no approach to the physical measurement of the status of this dissociation process until now.

We introduced the neuraminidase to the system of sugar chain modified graphene FET. The neuraminidase dissolves sialic acid, and the negative charge of the carboxyl group of the sialic acid is removed. Then, the induced positive charge in the graphene channel by this negative charge is decreased, and we have first succeeded in observing the decrease of the drain current by this reaction as shown in Fg.2. This is the first time result that captures the dissociation process of virus by the neuraminidase from sugar chain by electrical method.

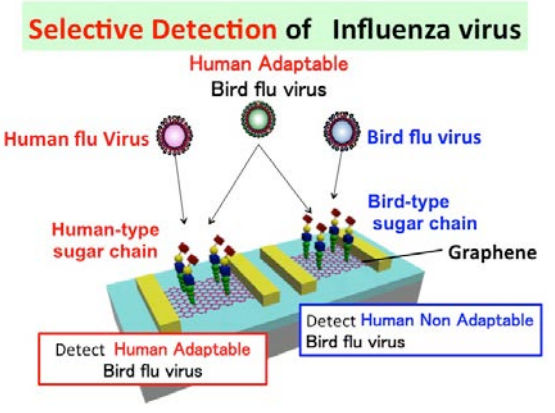

Fig.1, Schematic of Sugar modified Graphehe FET for the selective detection of influenza virus.

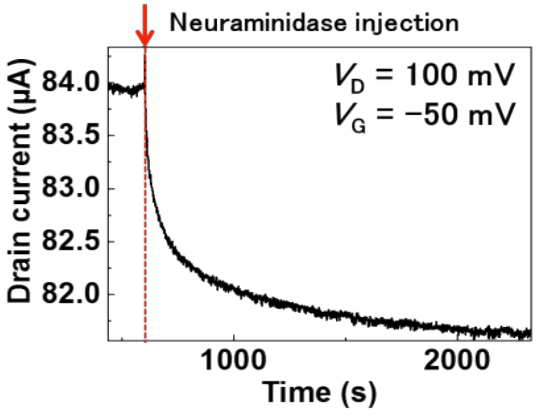

Fig.2, Time dependence of neuraminidase reaction monitored by G-FET.

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