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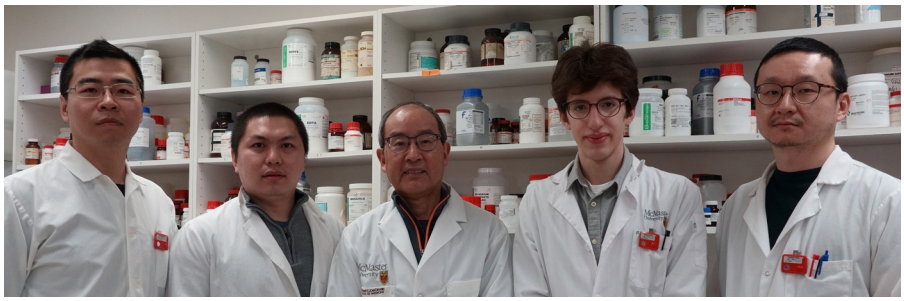
# A Universal DNA Aptamer that Recognizes Spike Proteins of Diverse SARS-CoV-2 Variants of Concern



**Invited for the cover of this issue are John Brennan, Yingfu Li, and co-workers at McMaster University. The image depicts MSA52 as a universal DNA aptamer that recognizes spike proteins of diverse SARS-CoV-2 variants of concern. Read the full text of the article at 10.1002/chem.202200078.**

## *What is the most significant result of this study?*

This study reports on a unique DNA aptamer, denoted MSA52, that displays a universally high affinity for the spike proteins of wildtype SARS-CoV-2 as well as the Alpha, Beta, Gamma, Epsilon, Kappa, Delta, and Omicron variants. This aptamer also recognizes pseudotyped lentiviruses (PL) expressing eight different spike proteins of SARS-CoV-2 with $K_d$ values between 20–50 pM. It was integrated into a simple colorimetric assay for the detection of multiple PL variants. This discovery provides evidence that aptamers can be generated with high affinity to multiple variants of a single protein, including emerging variants, making them well-suited for molecular recognition of rapidly evolving targets such as those found in SARS-CoV-2.

## *What was the inspiration for this cover design?*

The cover design takes three factors into consideration. First, the unique DNA aptamer MSA52 displays a universally high affinity for the spike proteins of multiple SARS-CoV-2 variants, which are assigned red, green, and blue colors for the Alpha, Beta, and Delta variants with relatively fewer mutations, and the combination of red, green, and blue colors for the Omicron variant that has significantly more mutations. Second, the MSA52 aptamer, which adopts a unique four-way junction stem-loop structure, is depicted as a three-finger clamp for chelating the receptor-binding domain (RBD) of trimeric spike proteins. Third, the background green fluorescence signals the binding event between the aptamer MSA52 and the spike proteins of SARS-CoV-2 variants.

## *What other topics are you working on at the moment?*

Besides the research featured in this paper on the selection of a universal aptamer for SARS-CoV-2 variants, we are also working on designing biosensors with functional nucleic acids, specifically DNA aptamers and DNAzymes, with a goal to achieve rapid point-of-care testing for infectious agents such as SARS-CoV-2. For example, we are developing lateral flow test strips and portable electrochemical chips with dimeric and multimeric aptamers that recognize SARS-CoV-2 viruses in easily accessible biological samples such as saliva. We believe such rapid and cost-effective tests are needed for the detection of viral or bacterial pathogens that pose significant threats to human health.