

公開セミナー

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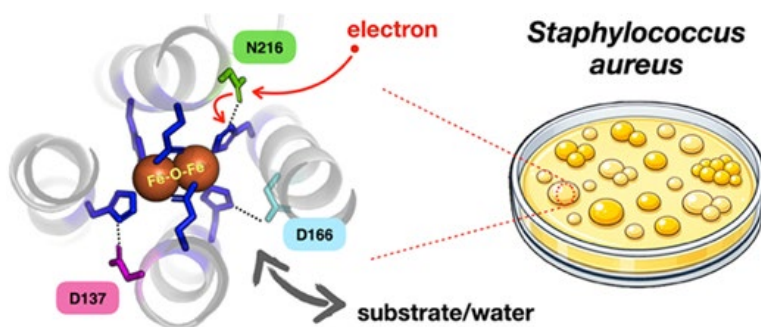
演題：**Structural and Functional Features of the Diiron Protein ScdA**

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概要：Staphylococcus aureus ScdA has been traditionally implicated in protecting bacterial cells against oxidative and nitrosative stress through the preservation of iron-sulfur cluster integrity. In this study, we employ an integrative structural biology approach combining X-ray crystallography, NMR spectroscopy, electron spin resonance (ESR), and AlphaFold-based modeling to determine the full-length structure of ScdA and to uncover an unexpected enzymatic function.¹ Our structural analyses reveal that ScdA forms a homodimeric assembly stabilized by a flexible linker domain that mediates extensive hydrophobic contacts and hydrogen-bonding interactions between subunits. Remarkably, biochemical assays together with EPR measurements demonstrate that ScdA is capable of catalyzing the reduction of nitrite to nitric oxide (NO) in vitro. Consistent with this activity, heterologous overexpression of ScdA in *Escherichia coli* leads to pronounced growth inhibition under nitrite stress conditions in vivo. These findings challenge the prevailing view of ScdA solely as a defensive factor against nitrosative stress and instead suggest a multifunctional role in which a single di-iron center supports both iron-sulfur cluster maintenance and NO generation. Elucidating the regulatory mechanisms and physiological contexts that govern this functional duality will be essential for understanding ScdA activity in *S. aureus*.² Collectively, our results establish ScdA as a versatile di-iron protein and highlight its potential as a target for the development of novel antimicrobial strategies.



adapted from *JACS Au*, **6**, 2445 (2026).

1. “[Structure and Nitrite Reductase Activity of the Di-iron Protein ScdA in Staphylococcus aureus](#)”, H.Y. Chen, R.F. Tsai, Y.S. Lu, Y.C. Cheng, H.Y. Fan-Chiang, C.Y. Wu, F.C. Lo, H.W. Kuo, W.K. Yang, W.Y. Liao, N.J. Hu, S.C. Sue, Y.W. Chiang, *J. Am. Chem. Soc.*, **147**, 31558-31569 (2025).
2. “[Matrix Control of Solvent and Electron Flow in a Nonheme Diiron Nitrite Reductase](#)”, H.Y. Chen, Y.S. Lu, C.C. Cheng, F.C. Lo, T. Yang, Y.W. Chiang, *JACS Au*, **6**, 2445-2454 (2026).

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