Energy conversion mechanism of an ATP-driven rotary ion pump *Enterococcus hirae* V-ATPase

Ryota Iino[1,2]

[1]*Institute for Molecular Science, National Institutes of Natural Sciences, Japan*

[2]*Graduate Institute for Advanced Studies, SOKENDAI, Japan*

iino@ims.ac.jp

V-ATPase from *Enterococcus hirae* (EhV_oV_1, Figure 1) is a rotary ion pump that actively transports Na^+ driven by ATP hydrolysis, enabling this bacterium to grow in alkaline environments by maintaining Na^+ homeostasis inside the cell. EhV_oV_1 is a complex of two rotary motors, ATP-driven V_1 and Na^+-transporting V_o. We have been studying energy conversion mechanism of the EhV_oV_1 using single-molecule, biochemical, and structural analyses [1-11].

In this presentation, I would like to introduce our recent results, especially on chemo-mechanical coupling of ATP hydrolysis and ion transport between V_1 and V_o [4, 5], torque generation of V_1 moiety and V_oV_1 whole complex [2, 8], reversibility of ATP hydrolysis/synthesis reaction and ion transport [10], conversion of transport ion selectivity from Na^+ to H^+ [11], and a mechanism to realize active ion transport against the concentration gradient across the lipid membrane [11].

References

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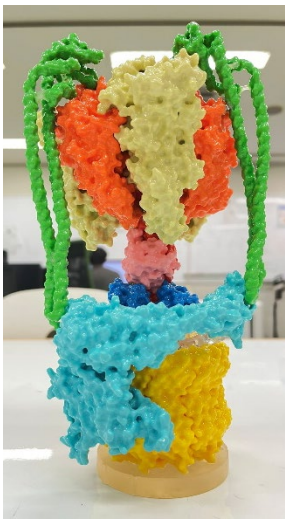

Figure 1. 3D-printed structural model of EhV_oV_1.