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Supporting information for article:

Structural and functional characterization of a thermostable secretory phospholipase A_2 from *Sciscionella marina* and its application in liposome biotransformation

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Table S1 Primers used in cloning of *Sm*-sPLA$_2$ and its variant

Name	Sequence (5' → 3')	Description
Sm-sPLA$_2$_NcoI_F	CCGGCGATGGCCATGGAGAGCATCGAAAGCATCAC	To construct ESM1
Sm-sPLA$_2$_XhoI_R	GGTGGTGGTGCTCGAGACTGCCGAATTTGCGGAC	
Sm-sPLA$_2$_NcoI_F	AGGAGATATACCATGGAGAGCATCGAAAGCATCACCG	To construct ESM2, ESM3
Sm-sPLA$_2$_XhoI_R	GGTGGTGGTGCTCGAGACTGCCGAATTTGCGGACC	
Sm-sPLA$_2$_W41H_F	GATTCCTGCTCCCATGCCCCGGACAAAC	To construct ESM_W41H
Sm-sPLA$_2$_W41H_R	GTTTGTCCGGGGCATGGGAGCAGGAATC	
Mt-sPLA$_2$_NcoI_F	CCGGCGATGGCCATGGCGCTCACCCCCGAGCA	To construct EMT
Mt-sPLA$_2$_XhoI_R	GGTGGTGGTGCTCGAGCCCGACCGCGTGGCG	
Vm-sPLA$_2$_NcoI_F	CCGGCGATGGCCATGGCCGTCACTCCGGCACAG	To construct EVM
Vm-sPLA$_2$_XhoI_R	GGTGGTGGTGCTCGAGGAGTCGGGCGTGGCGCTC	

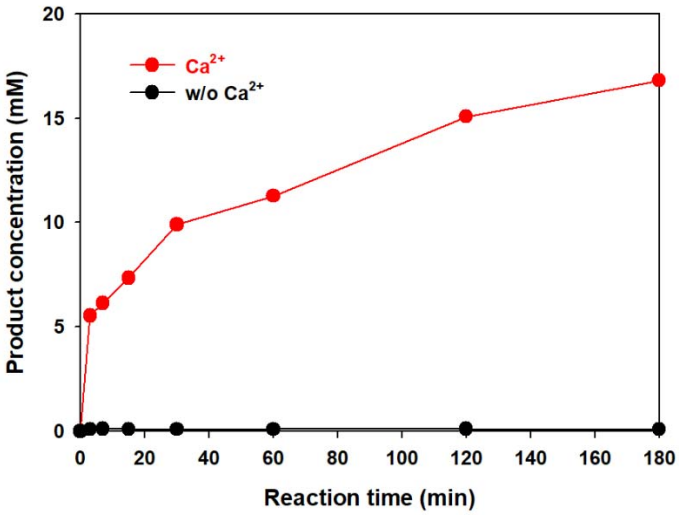

Figure S1 Effects of calcium ions on soy lecithin hydrolysis of *Sm*-sPLA$_2$. The biotransformations were performed by *Sm*-sPLA$_2$ (0.1 mg/mL) at pH 7.5 and 50 °C using soybean lecithin emulsion (crude soy lecithin concentration: 20 g/L) as substrate. The calcium ions (Ca^{2+}) were added to 6 mM into the reaction medium (50 mM Tris-HCl buffer). The product (i.e., lysolecithin (**2**)) concentrations were calculated based on the free fatty acid (**3**, **4**, and palmitic acid) concentrations, which had been produced from soy lecithin (Fig. 1).

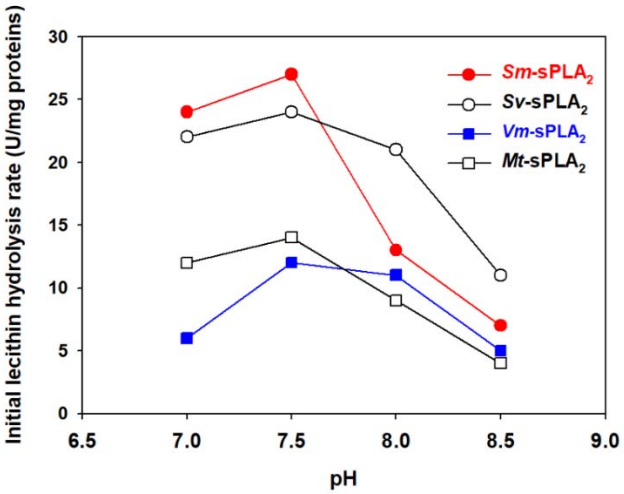

Figure S2 Effects of pH on soy lecithin hydrolysis of PLA_2s. The soy lecithin emulsion (crude soy lecithin concentration: 50 g/L) was subjected to hydrolysis by *Sv*-$sPLA_2$, *Sm*-$sPLA_2$, *Mt*-$sPLA_2$, and *Vm*-$sPLA_2$ at 50 °C in 50 mM Tris-HCl buffer.

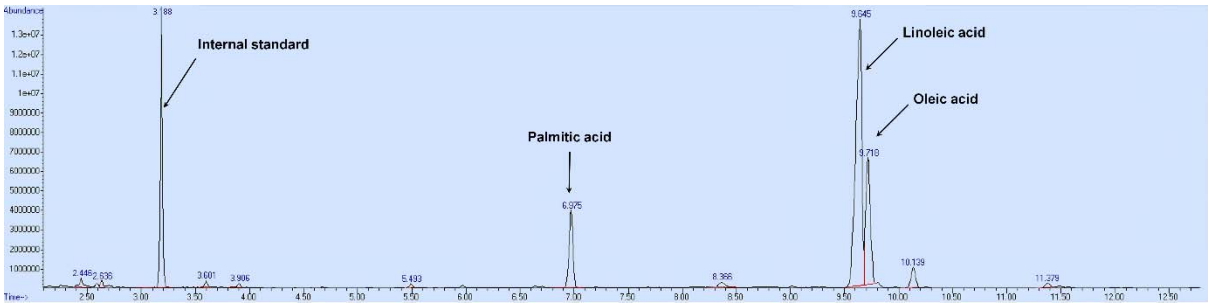

Figure S3 The free fatty acids (linoleic acid, oleic acid, and palmitic acid), which were produced from soy lecithin, were analyzed by GC/MS using 0.5 % dodecanoic acid as internal standard.

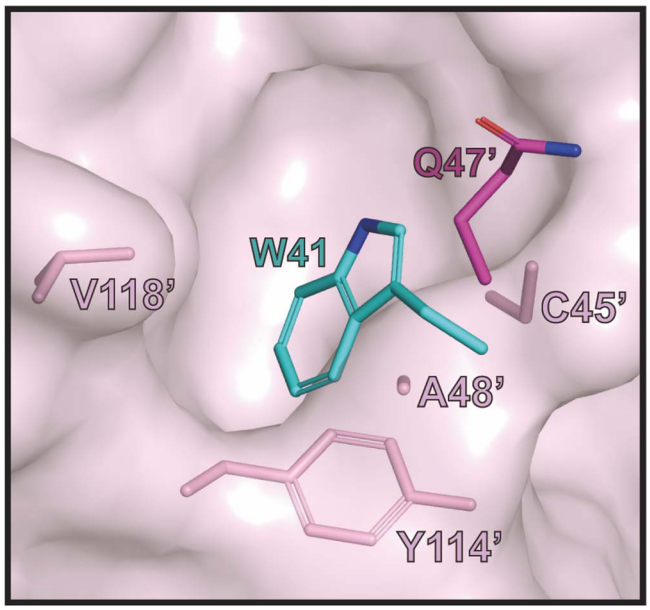

Figure S4 The hydrophobic pocket lined by Cys45', Ala48', Tyr114', and Val118' of *Sv*-sPLA$_2$ (pink). For this figure, only Trp41 of *Sm*-sPLA$_2$ (cyan) and Gln47' of *Sv*-sPLA$_2$ (magenta) are shown with *Sv*-sPLA$_2$ in surface representation.

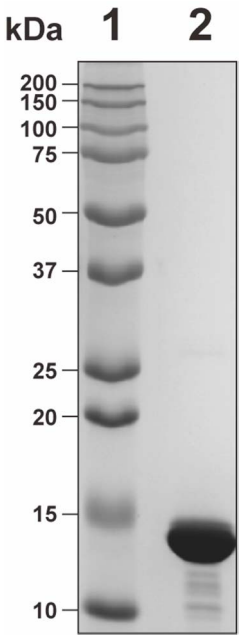

Figure S5 The SDS-PAGE result to show the purity and soluble expression of *Sm*-sPLA$_2$. Lane 1: Protein size marker. Lane 2: The final *Sm*-sPLA$_2$ sample obtained after the purification.