Electronic Supplementary Material for Nanoscale Advances.

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Supplemental Information

Three Dimensional Ti_3C_2 MXene Nanoribbons Frameworks with Uniform Potassiophilic Sites for Dendrite-Free Potassium Metal Anodes

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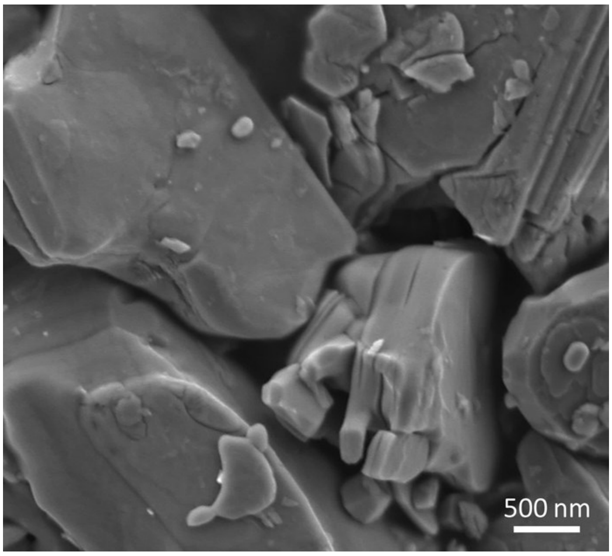

Fig. S1 SEM image of Ti_3AlC_2 MAX.

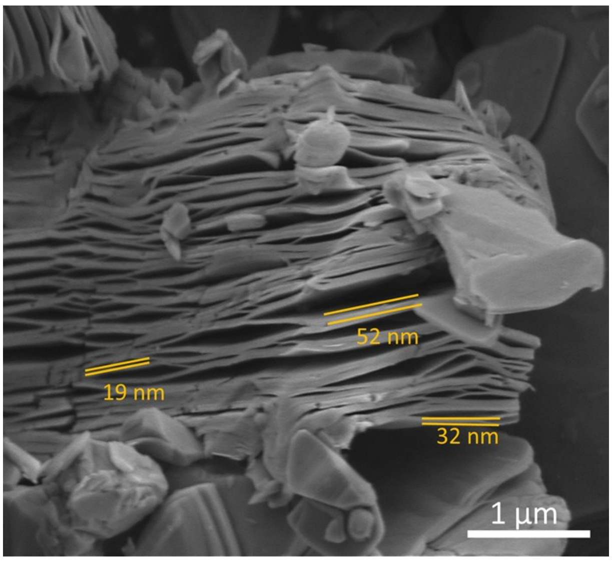

Fig. S2 SEM image of m-Ti_3C_2 MXene nanosheets.

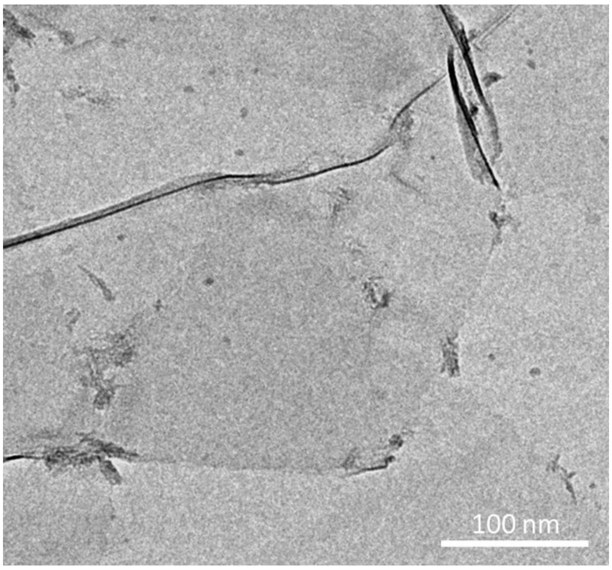

Fig. S3 TEM image of d-Ti_3C_2 MXene nanosheets.

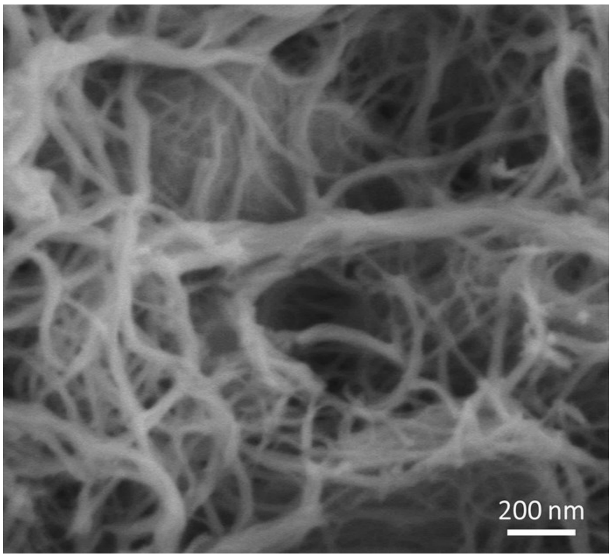

Fig. S4 SEM image of a-Ti_3C_2 MXene nanoribbon frameworks.

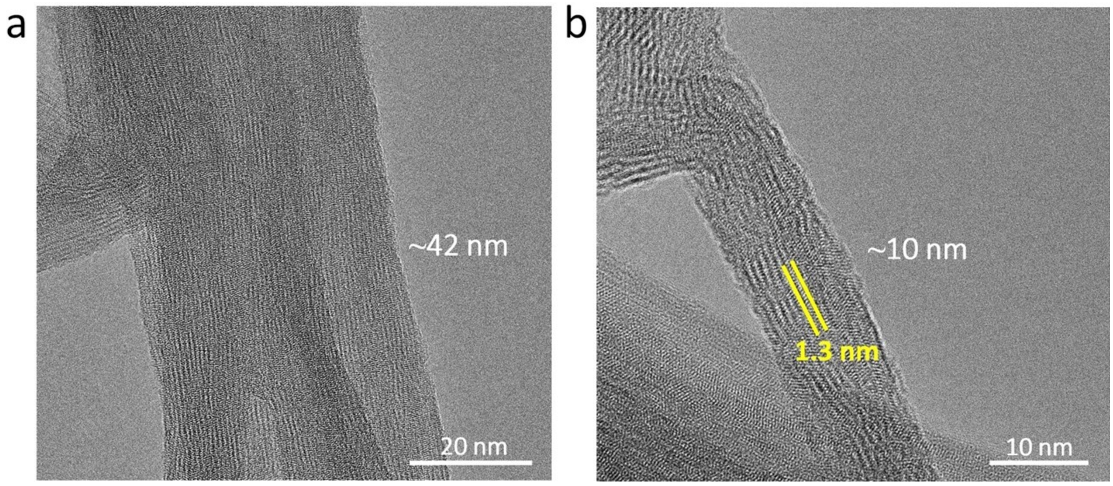

Fig. S5 (a,b) HRTEM images of a-Ti_3C_2 MXene nanoribbons.

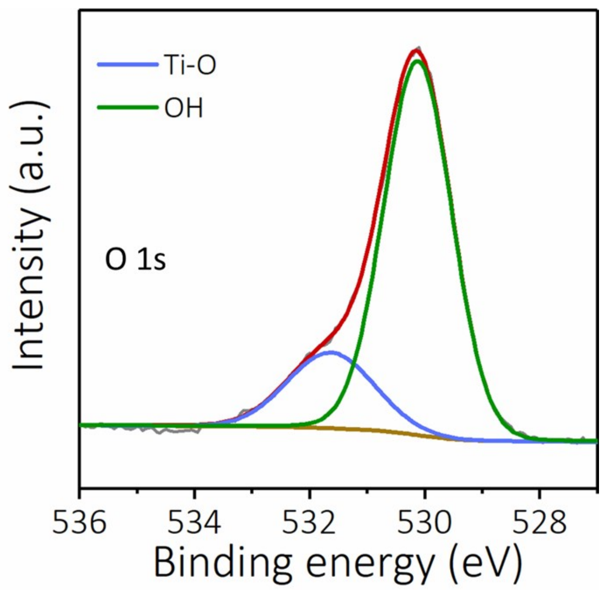

Fig. S6 High resolution O1s XPS spectrum of a-Ti_3C_2 nanoribbons.

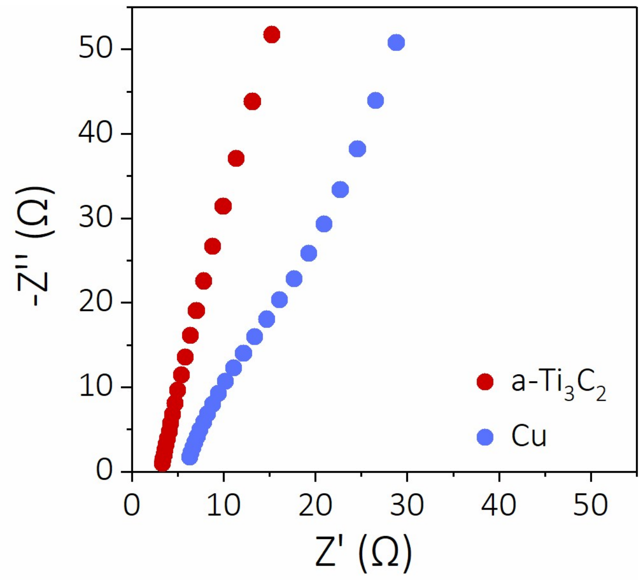

Fig. S7 Nyquist plots of the a-Ti_3C_2 MXene/K and bare Cu/K asymmetric batteries.

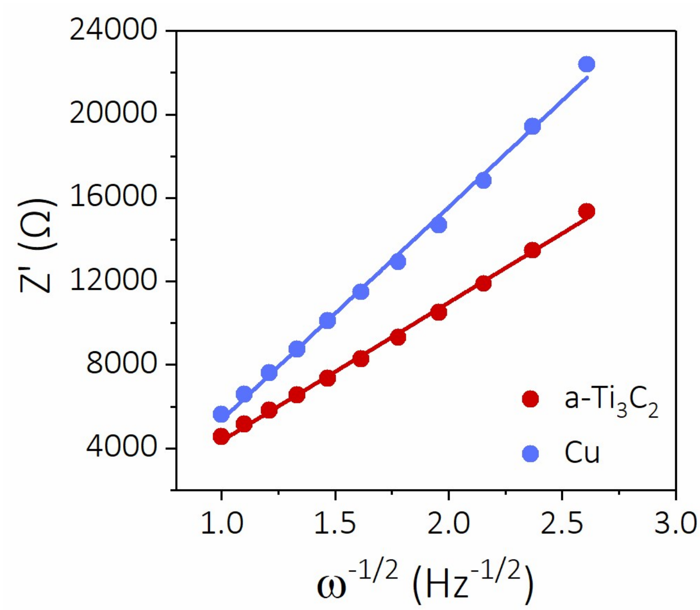

Fig. S8 The relationship of between *Z′* and square root of the frequency ($\omega^{-1/2}$) in the low-frequency region for the a-Ti_3C_2 MXene/K and bare Cu/K asymmetric batteries.

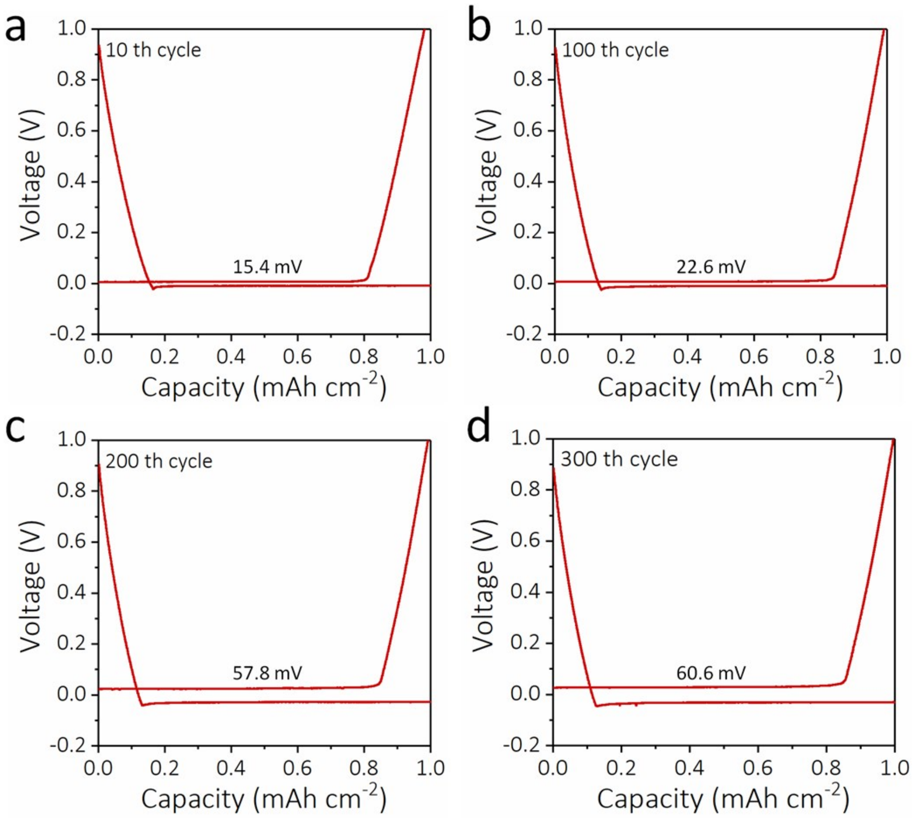

Fig. S9 Voltage profiles of a-Ti_3C_2 MXene electrode tested at different cycles. Plant 1 mAh cm^{-2} of K at a current density 1 mA cm^{-2} at (a) 10th cycle, (b) 100th cycle, (c) 200th cycle, and (d) 300th cycle.

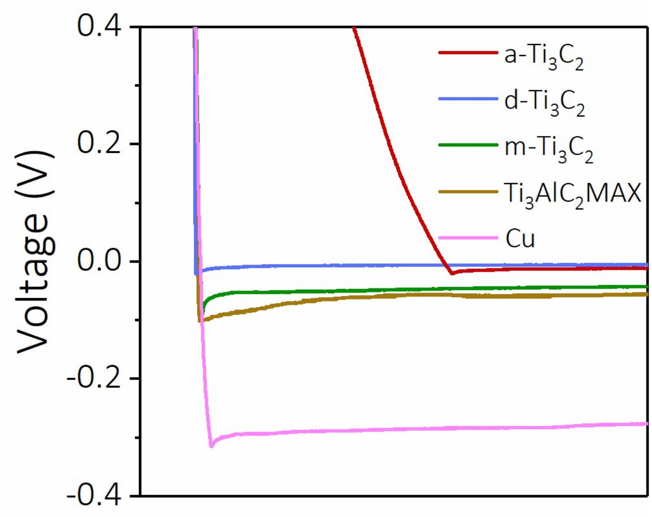

Fig. S10 Nucleation section on the voltage profiles of a-Ti_3C_2 MXene, d-Ti_3C_2 MXene, m-Ti_3C_2 MXene, Ti_3AlC_2 MAX and bare Cu electrodes with K deposition capacity of 1 mAh cm^{-2} at 1 mA cm^{-2}.

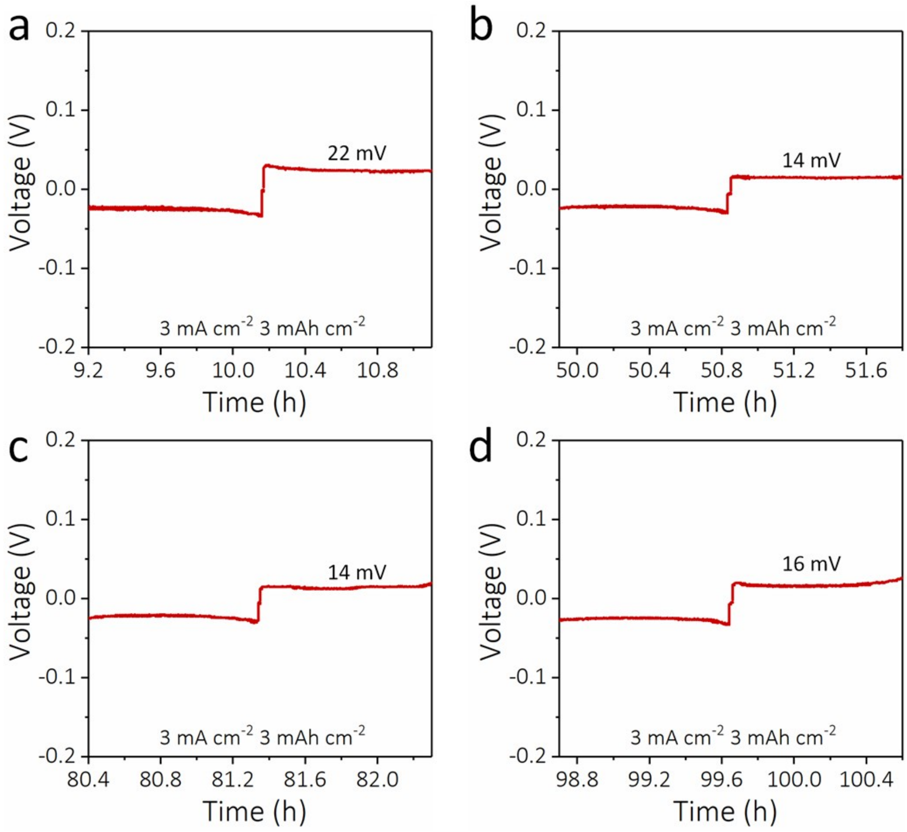

Fig. S11 Detailed voltage profiles of a-Ti_3C_2-K symmetric battery at different time. Planting 3 mAh cm^{-2} of K at current density of 3 mA cm^{-2} for (a) 10 h, (b) 50 h, (c) 80 h, and (d) 100 h, respectively.

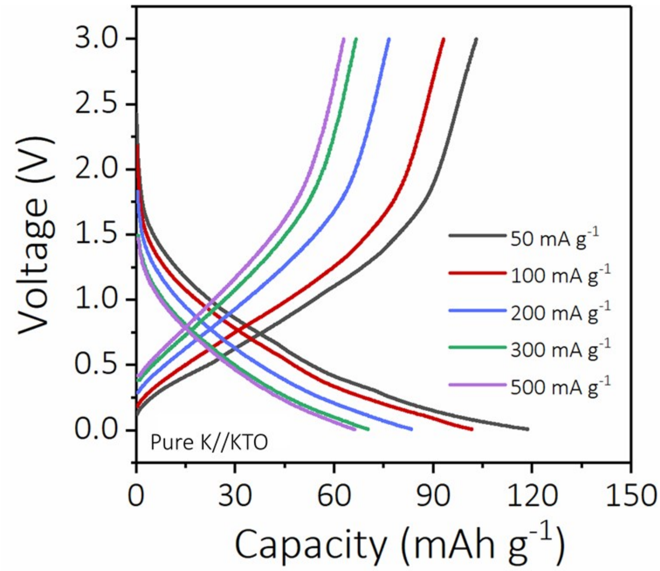

Fig. S12 Charge and discharge profiles of pure K//KTO battery tested at different rates.

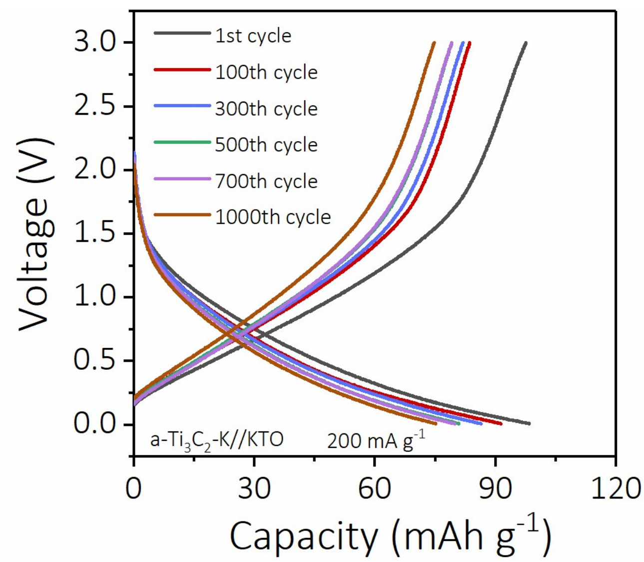

Fig. S13 Charge and discharge profiles of a-Ti_3C_2-K//KTO battery obtained at different cycles at 200 mA g^{-1}.

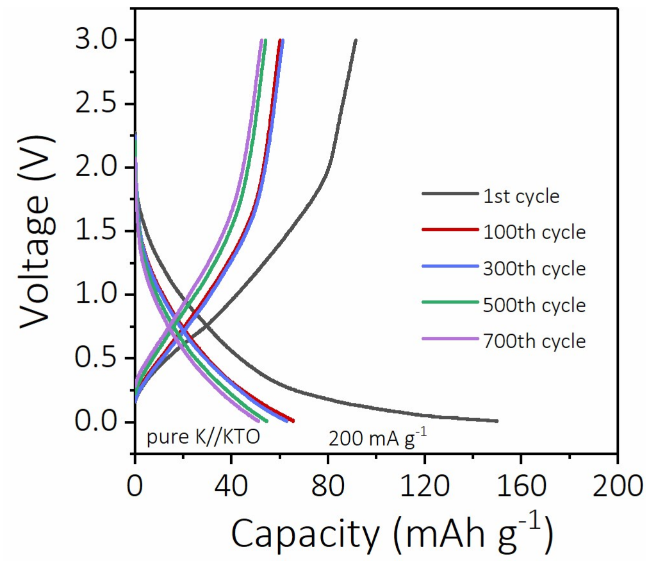

Fig. S14 Charge and discharge profiles of pure K//KTO battery obtained at different cycles at 200 mA g^{-1}.

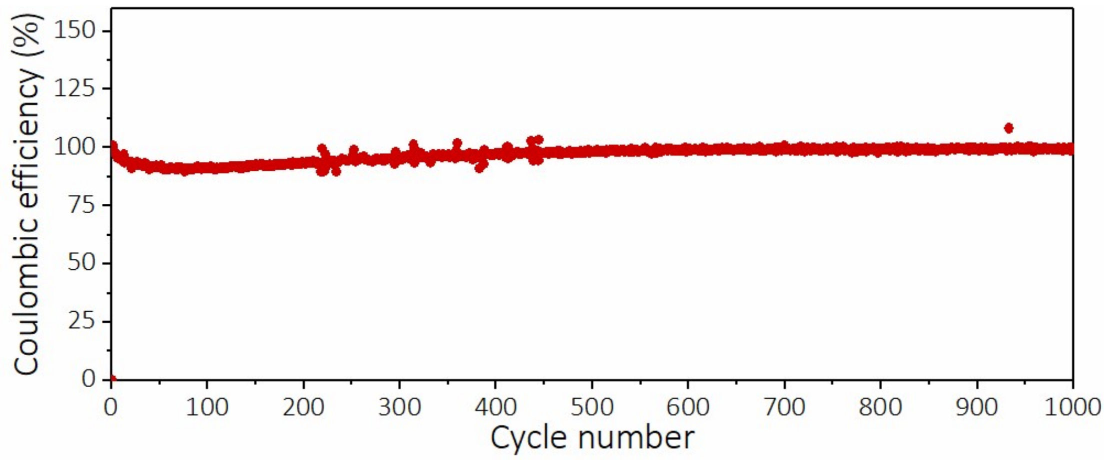

Fig. S15 Coulombic efficiency of a-Ti_3C_2-K//KTO battery tested at 200 mA g^{-1}.

Table S1. Performance comparison of a-Ti_3C_2-K electrode with the state-of-the-art K anodes recently reported

Anode materials	Current density (mA cm^{-2})	Areal capacity (mAh cm^{-2})	Cycle time (h)	Refs.
rGO@3D-Cu	0.5	0.5	200	Ref. [1]
ACM	5	1	58	Ref. [2]
PCNF@SnO_2	1	10	350	Ref. [3]
DN-MXene/CNT	0.5	0.5	300	Ref. [4]
HNCP/G	1	1	100	Ref. [5]
PM/NiO	0.4	0.1	100	Ref. [6]
K-Hg	0.5	0.5	250	Ref. [7]
Polished K metal	0.1	0.02	80	Ref. [8]
a-Ti_3C_2	**5**	**10**	**700**	**This work**
	5	**5**	**800**	

ACM: ligned carbon nanotube membrane; PCNF@SnO_2: SnO_2-coated conductive porous carbon nanofiber framework; DN-MXene: defect-rich and nitrogen-containing MXene; HNCP/G: hollow N-doped C polyhedrons/graphene; PM: puffed millet.

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