
Presentation in Group Meeting at
20.05.2009
Janno Torop
Ikeda, Osaka

3-layer actuator synthesis

Actuator electrode layers:

A1

- CNT (ID:PO356) 50.1 mg
- $EMIBF_4$ (Aldrich) 124.5 mg
- PVdF-HFP (Kynar 2801) 50.1 mg
- DMAc ~(4 mL + 5 mL)

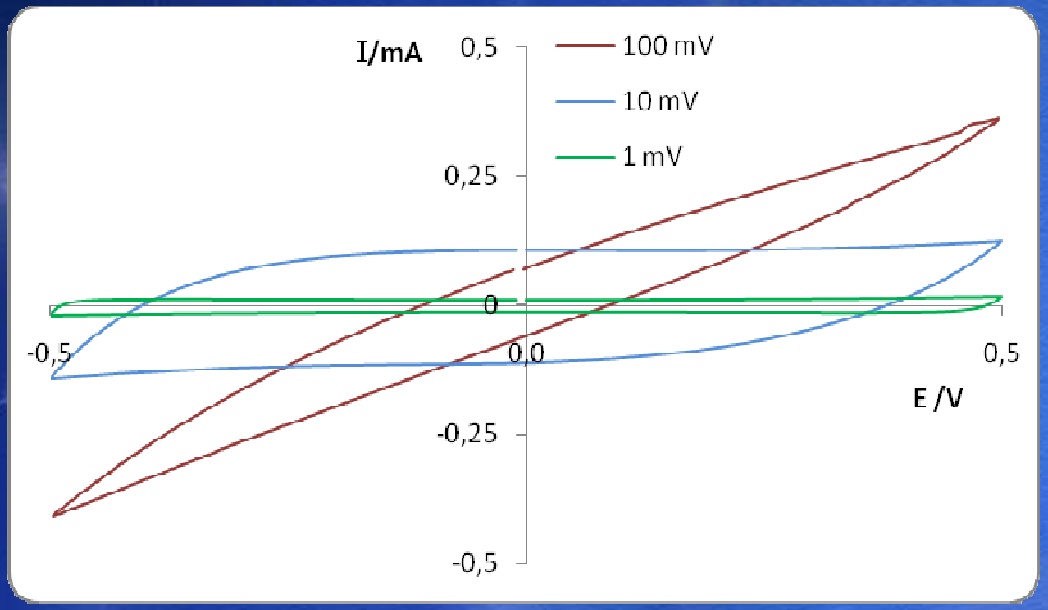
A2

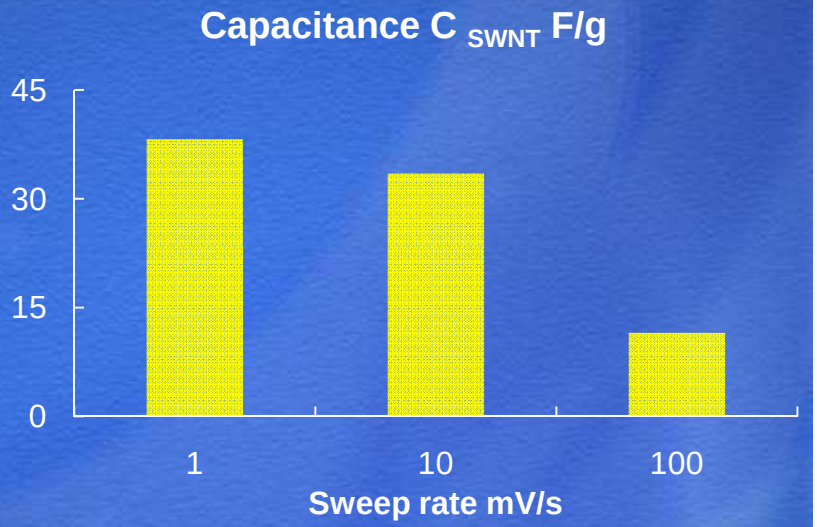
- CNT (ID:PO356) 50.1 mg
- $EMIBF_4$ (Aldrich) 124 mg
- PVdF-HFP (Kynar 2801) 80.3 mg
- DMAc ~(4 mL + 5 mL)

Actuator electrolyte layers:

- $EMIBF_4$ (Aldrich) 202 mg
- PVdF-HFP (Kynar 2801) 204.3 mg
- MP 2mL
- PC 497 mg

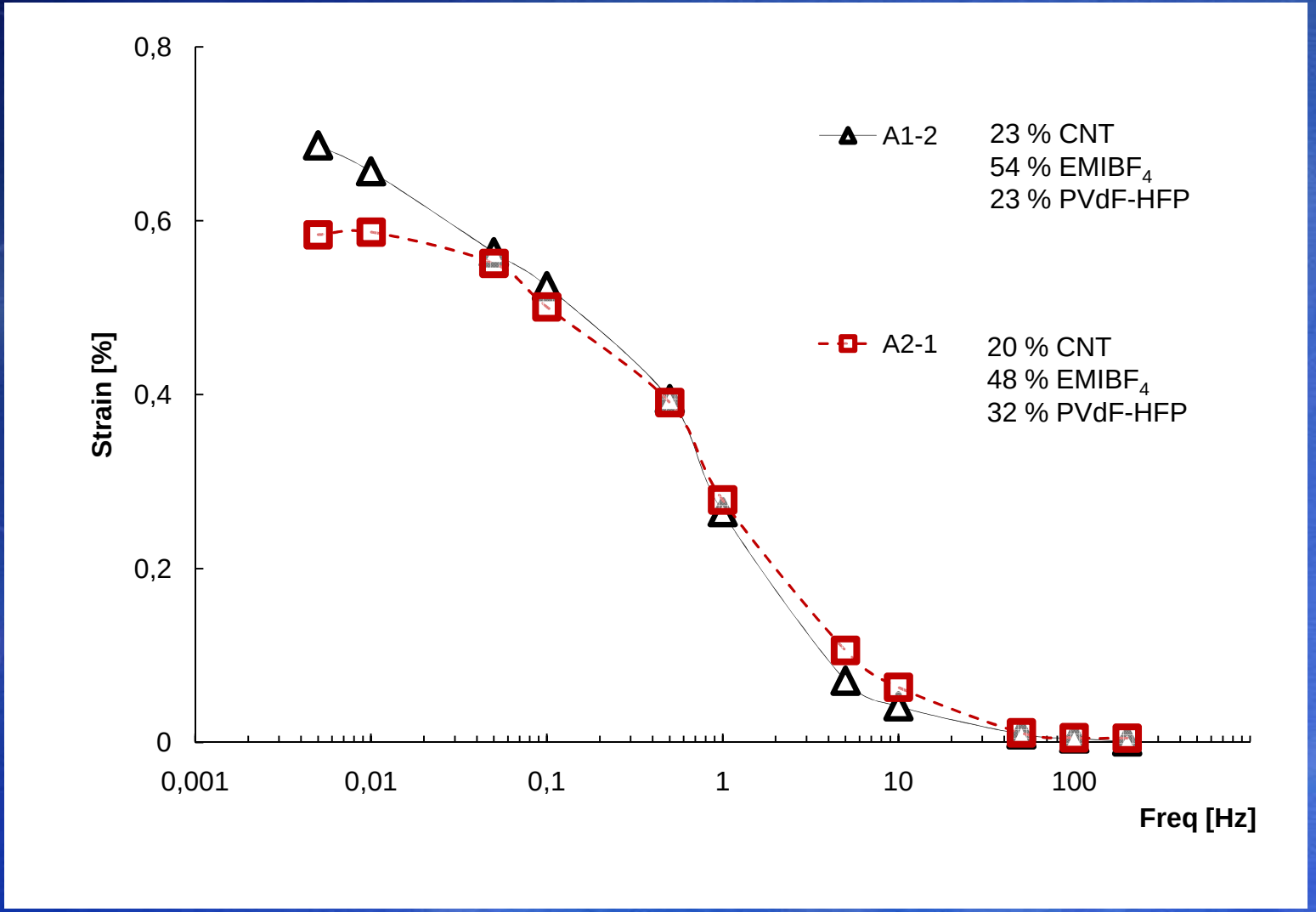
Actuator performance analysis





Gravimetric capacitance was calculated from cyclic voltammetry measurements of actuator at different sweep rates between voltage range ±0.5 V.

Actuator performance analysis



Generated strain calculated from the peak-to-peak value of the displacement of the actuator on the frequency of applied rectangle voltage ±2 V.

Synthesis of 3-layer actuator with asymmetrical displacement behavior

$OMIBF_4$ + CNT + PVdF

$OMIBF_4$ + $EMIBF_4$ + PVdF

$EMIB_4$ + CNT + PVdF

Synthesis of 3-layer actuator with asymmetrical displacement behavior

Electrode layers

E-1

- CNT (ID:PO356) 50.1 mg
- $EMIBF_4$ (Aldrich) 124 mg
- PVdF-HFP (Kynar 2801) 80.3 mg
- DMAc ~(4 mL + 5 mL)

E-2

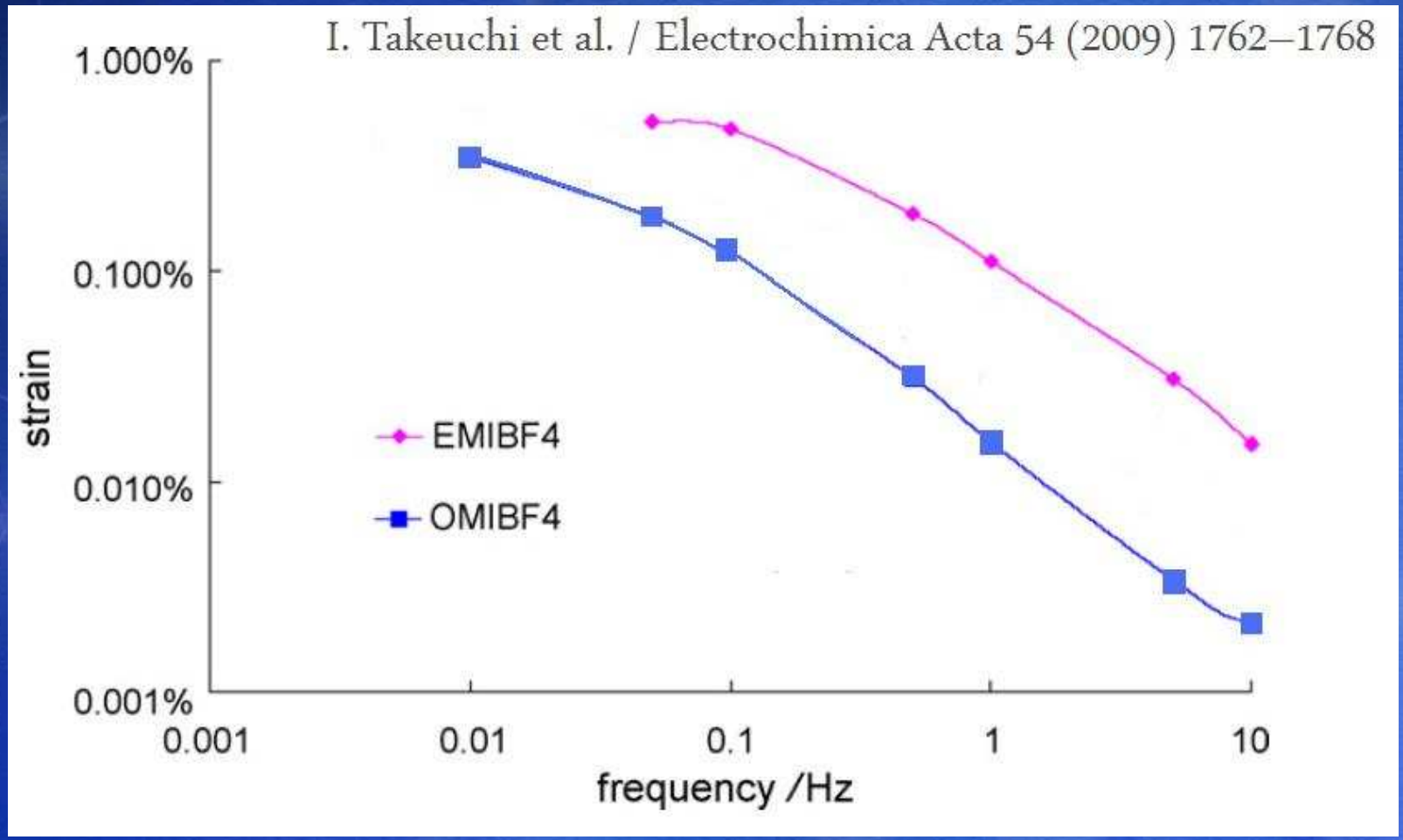
- CNT (ID:PO356) 50.2 mg
- $OMIBF_4$ (Aldrich) 169.2 mg
- PVdF-HFP (Kynar 2801) 80.1 mg
- DMAc ~(4 mL + 5 mL)

Electrolyte layer

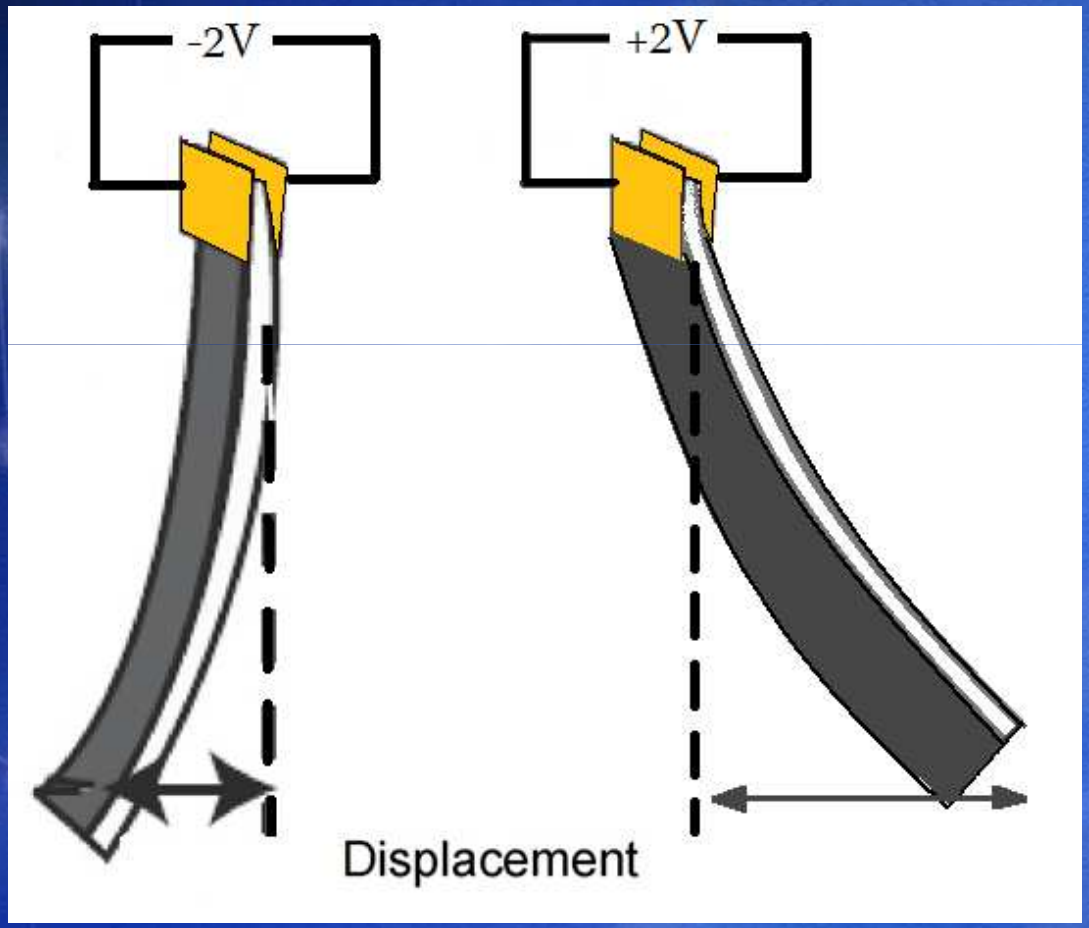
- $EMIBF_4$ (Aldrich) 99.8mg
- $OMIBF_4$ (Aldrich) 140.8 mg
- PVdF-HFP (Kynar 2801) 201.4 mg
- MP 2mL
- PC 497 mg

IL molar ratio in elctrolyte layer is 50% and 50 %

Synthesis of 3-layer actuator with asymmetrical displacement behavior



Prediction of response of actuator during measurement



Ionic liquid	Cation	
$EMIBF_4$		$R = C_2H_5$
$OMIBF_4$		$R = C_8H_{17}$

When rectangular voltage between potential range ±2 V is added to actuator strip, we expect asymmetrical displacement behavior.

During continuous cycles the asymmetrical behavior is expected to decrease.