

VESINIKUPÄEV 2023



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keemia instituut

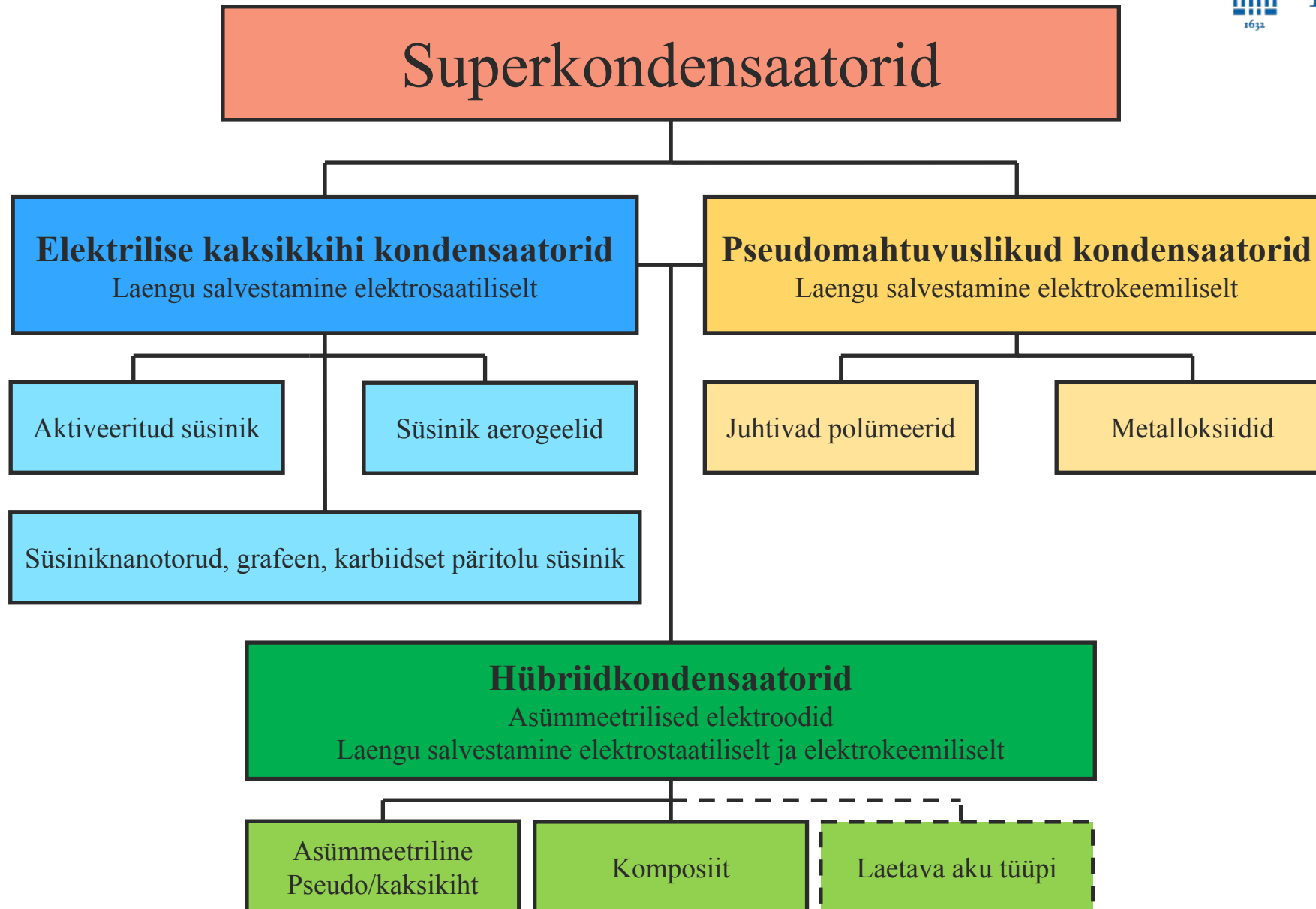
Kas patareide ja
superkondensaatorite
energiatihedust on võimalik
suurendada?

Alar Jänes

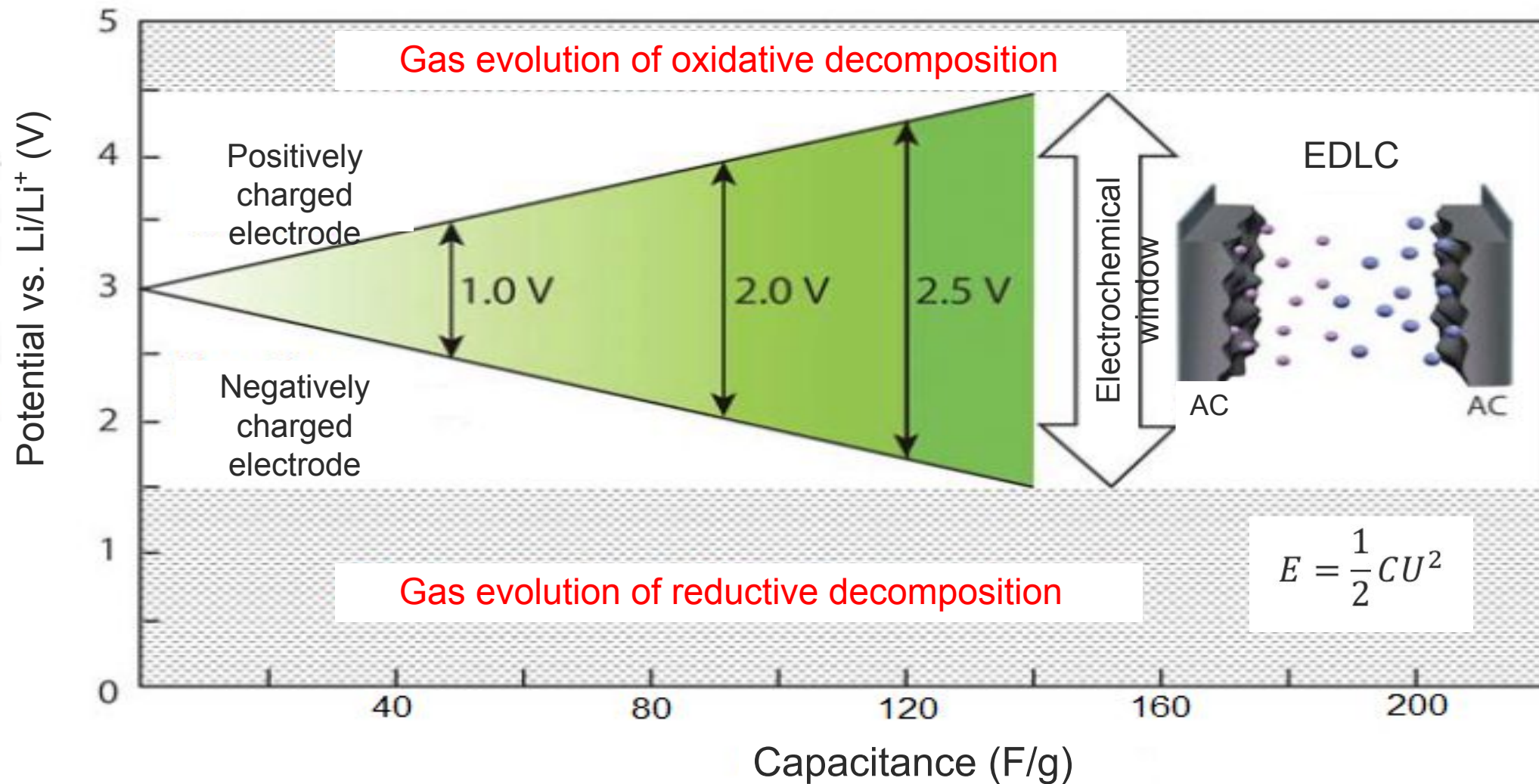


Superkondensaator 108 kWh / 60 km





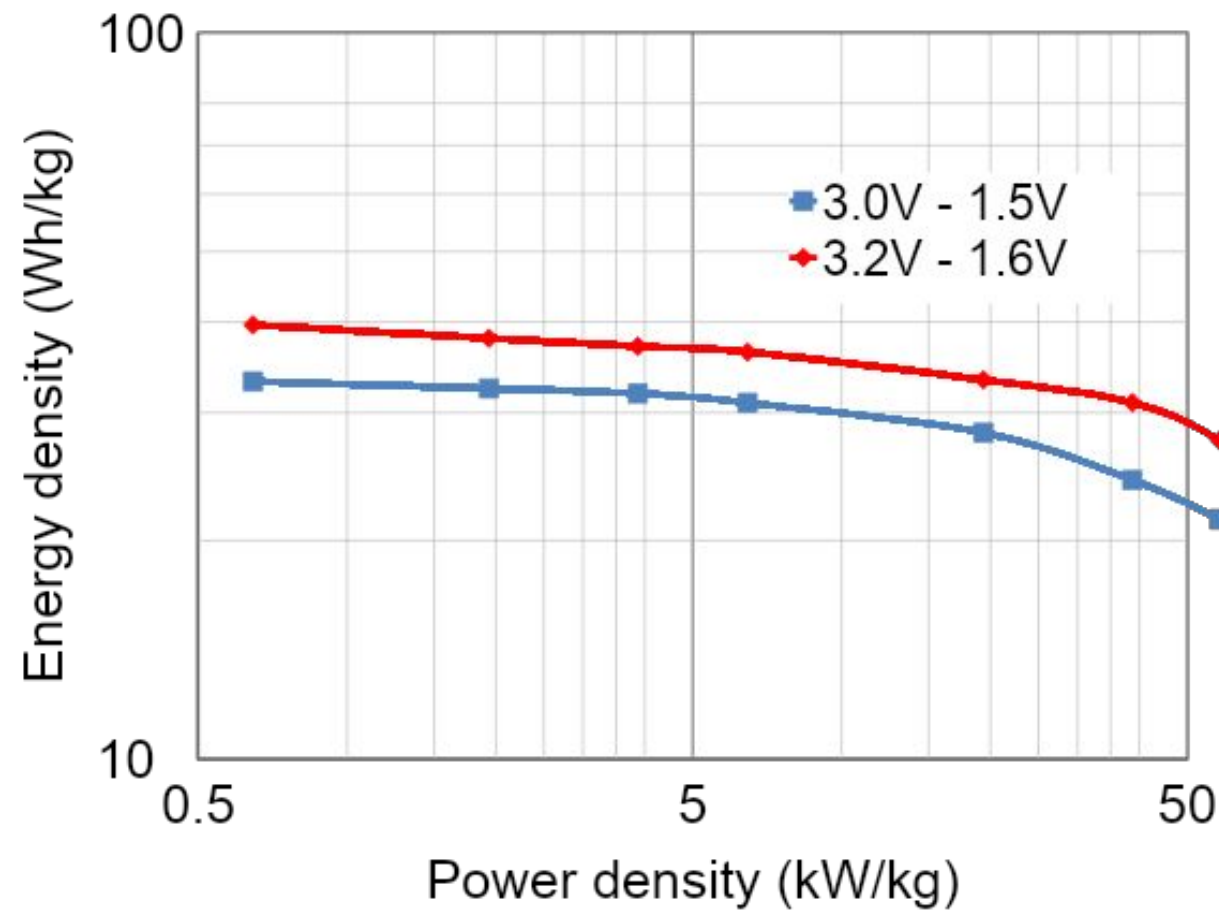
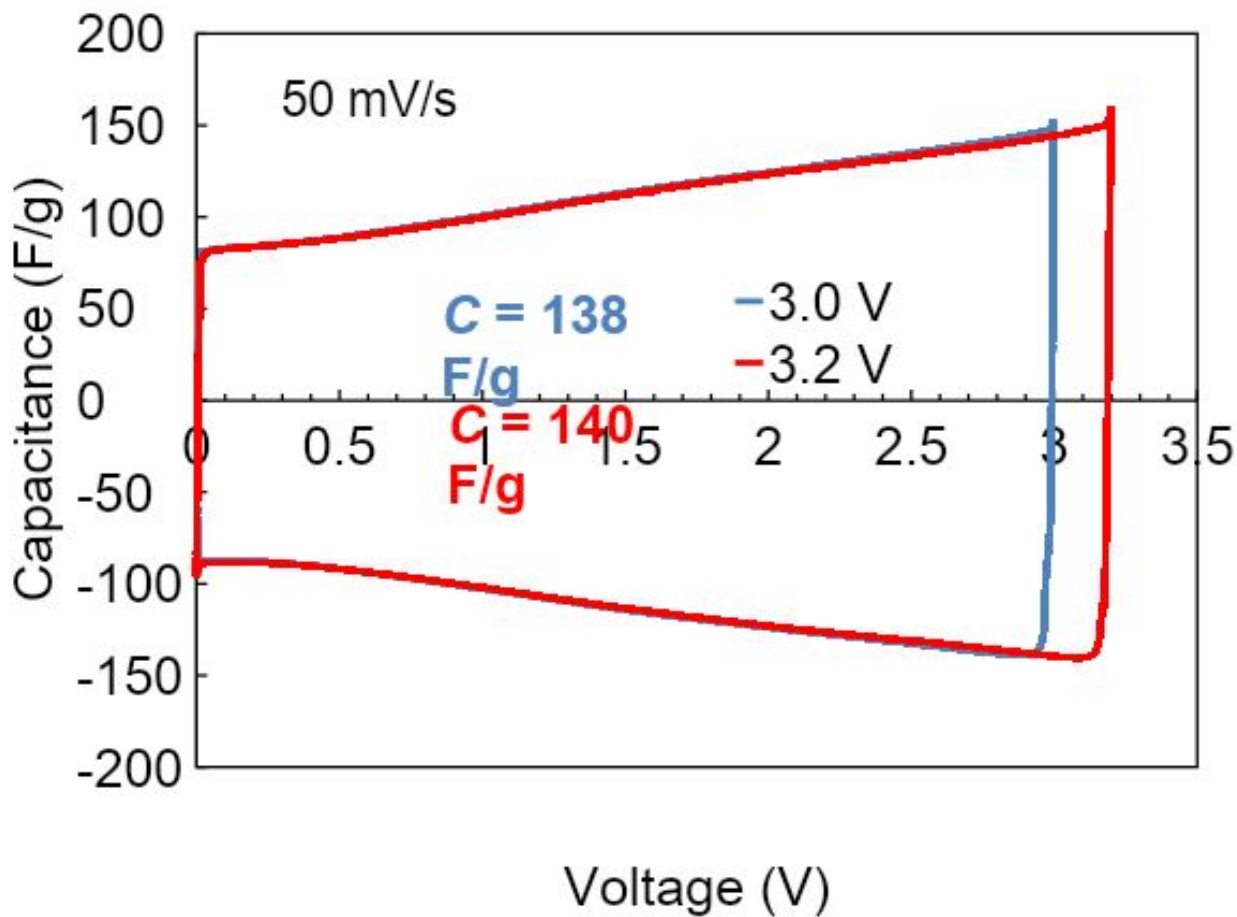
Energia salvestamine superkondensaatorites



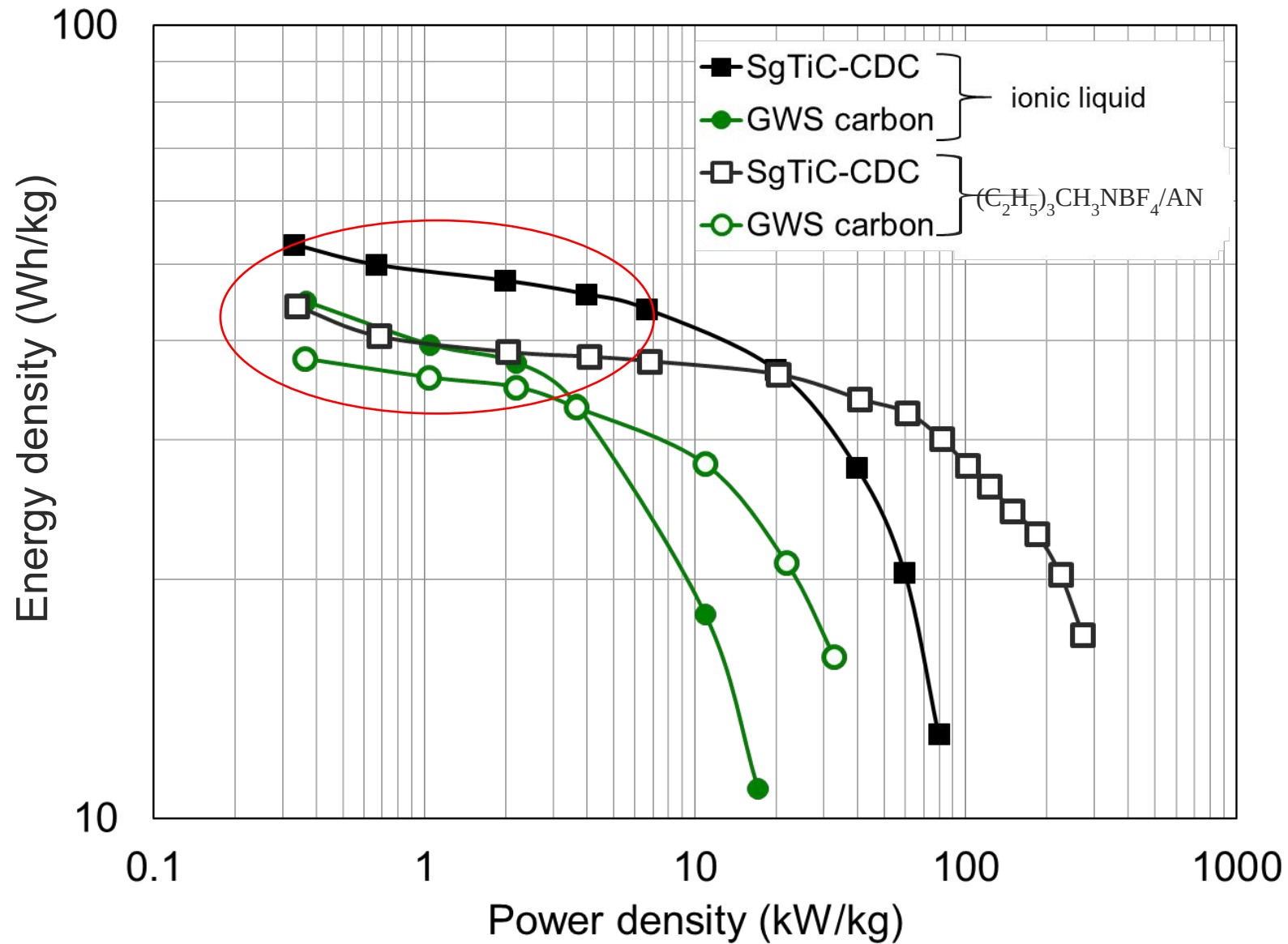
Kas mahtuvus või energia- ja võimsustihedus?



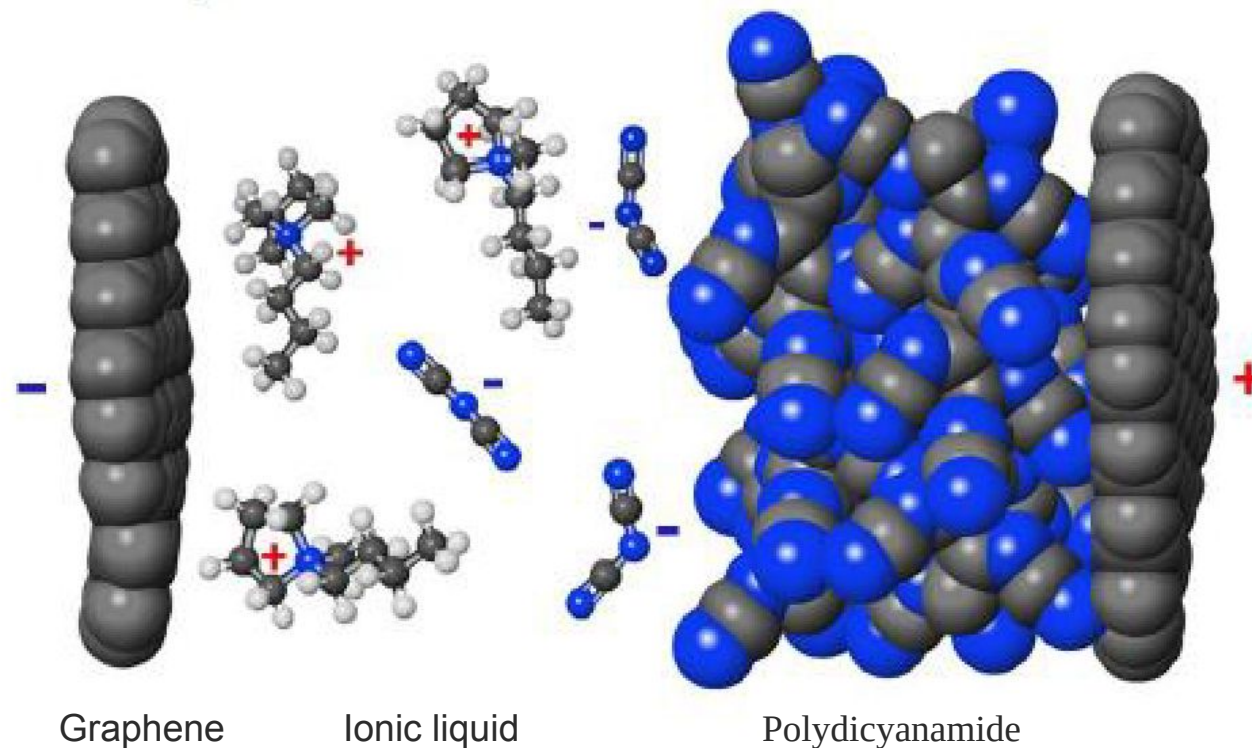
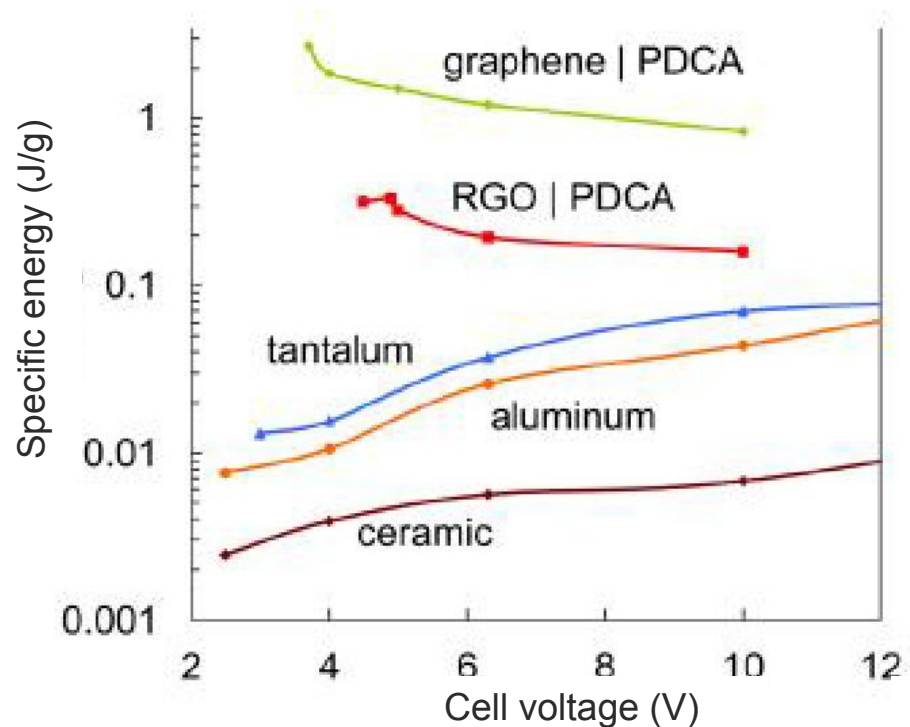
Elektrolüüt:
 $(C_2H_5)_3NBF_4$ / AN
S_qTiC-CD
C⁴



Elektrolüüdi mõju energiatihedusele



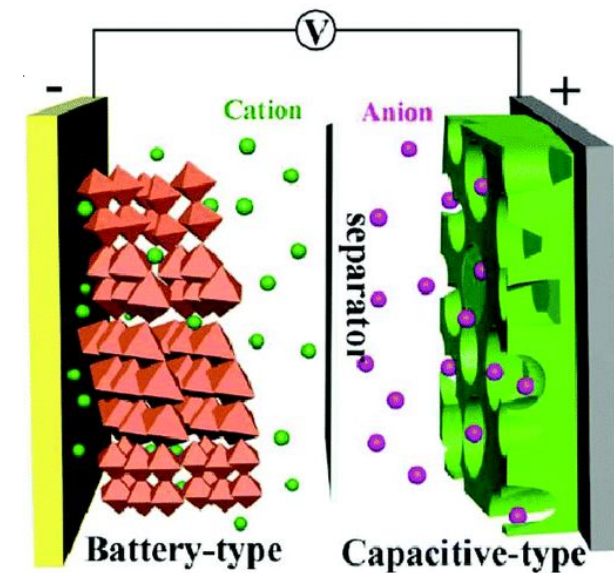
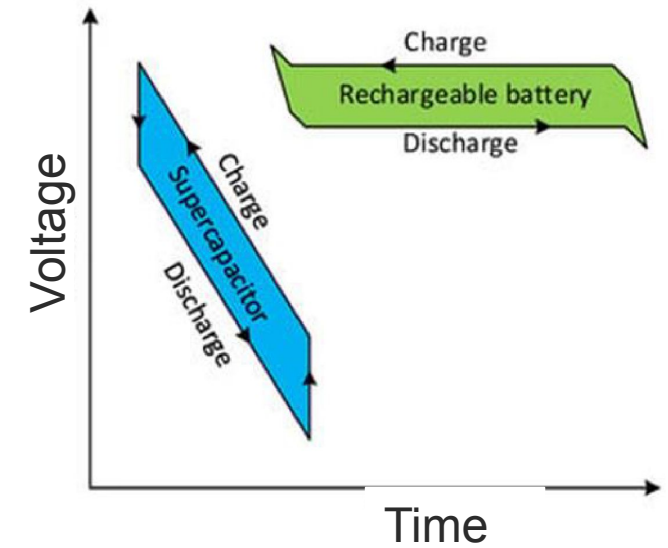
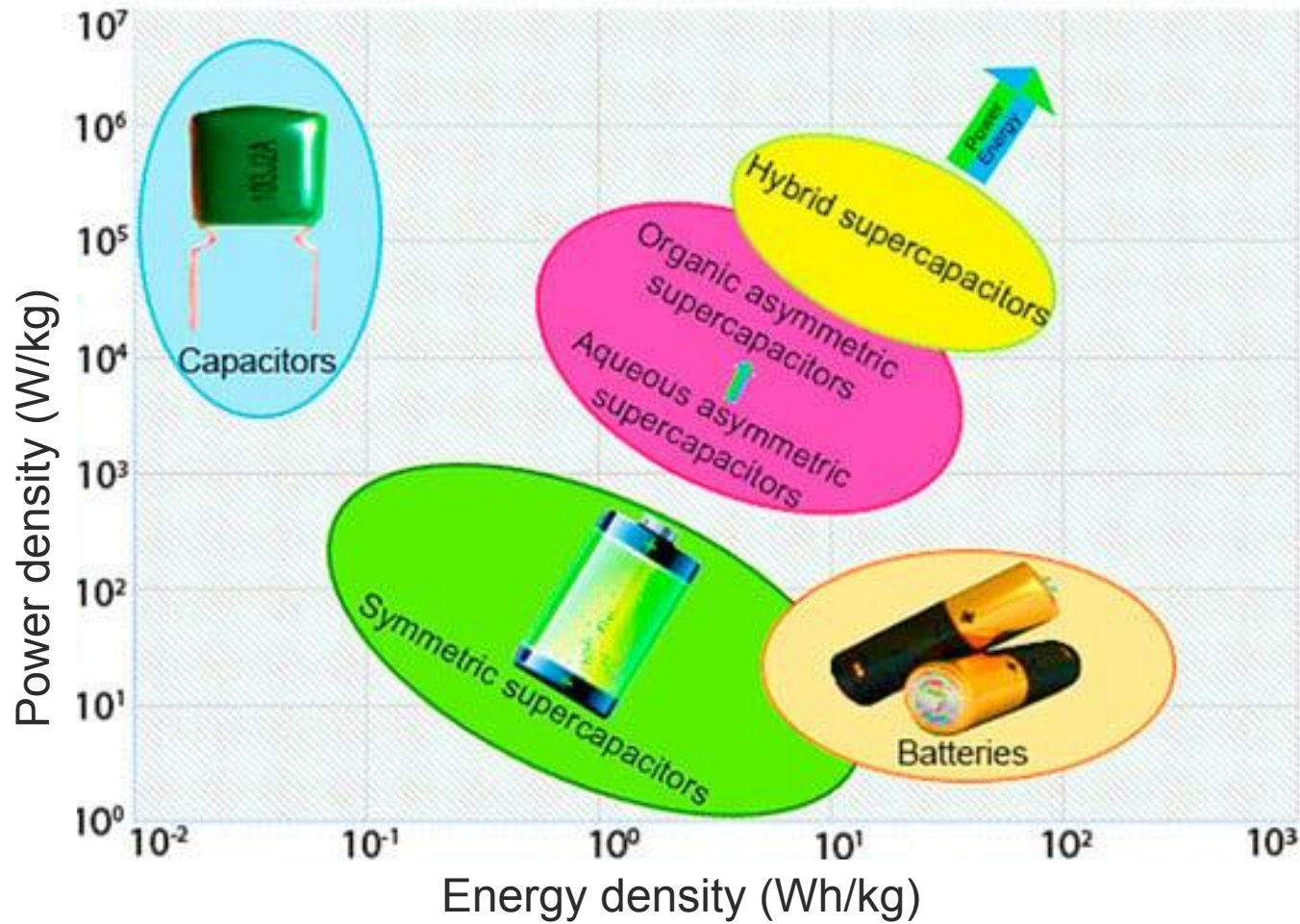
Kõrge pingega superkondensaator



Energia salvestamine hübriidsetes süsteemides

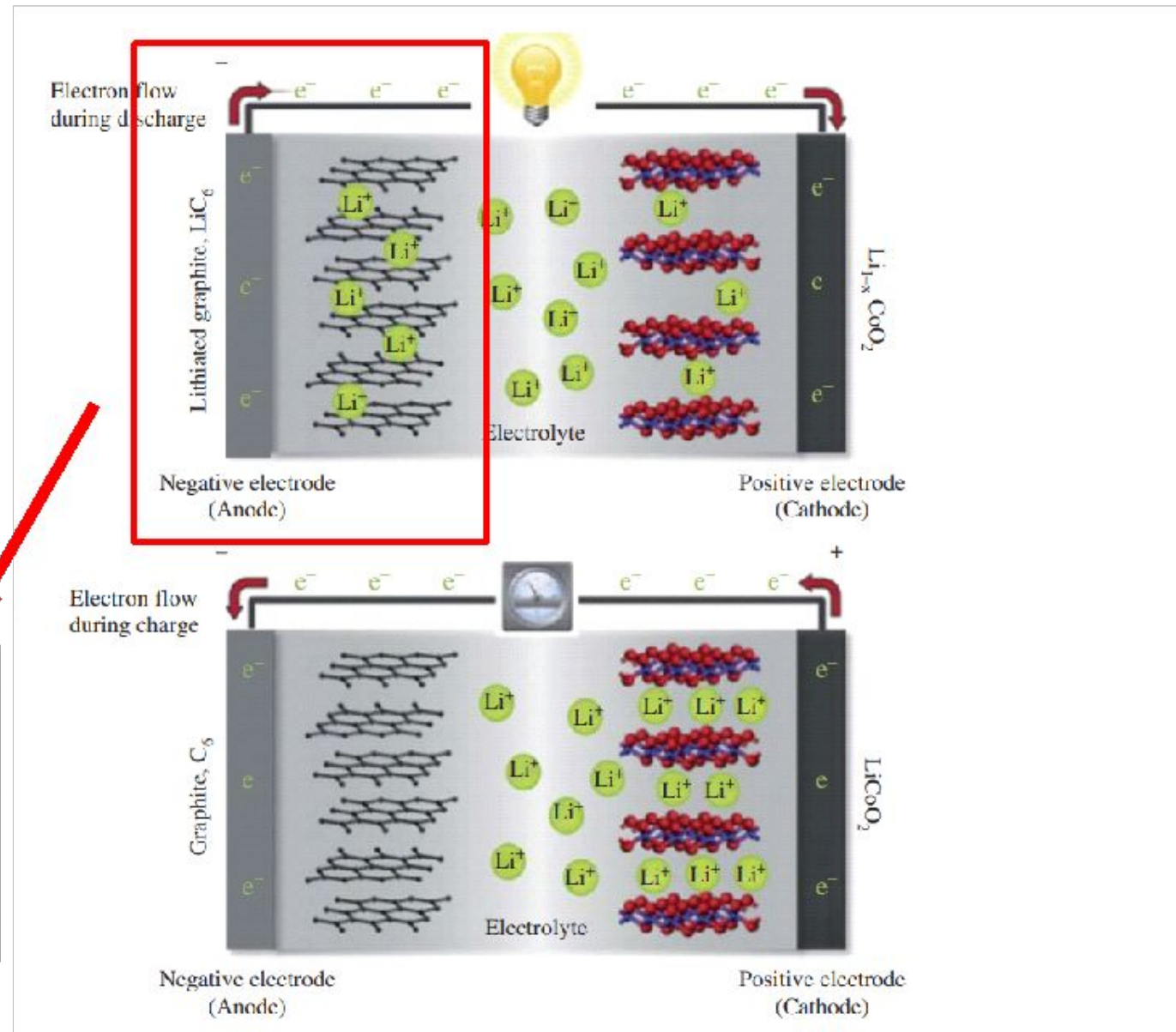


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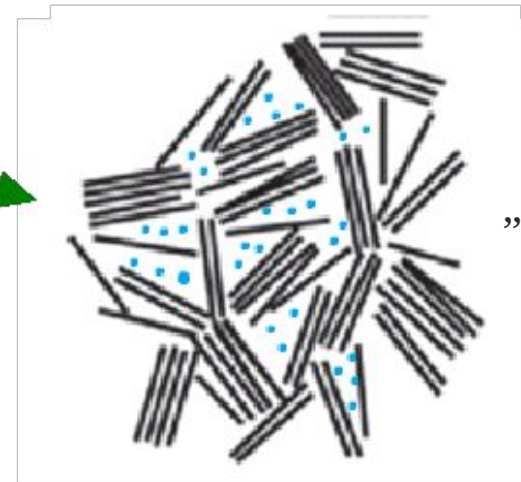
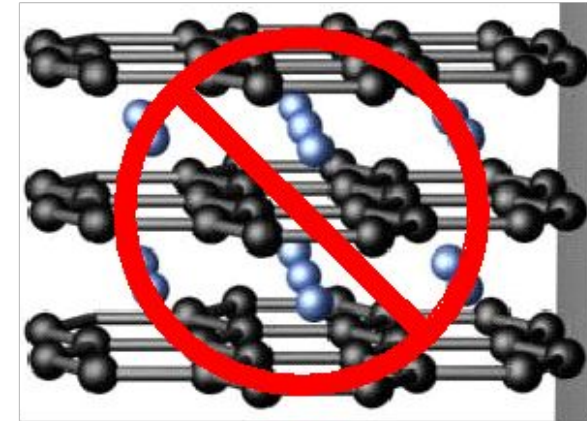
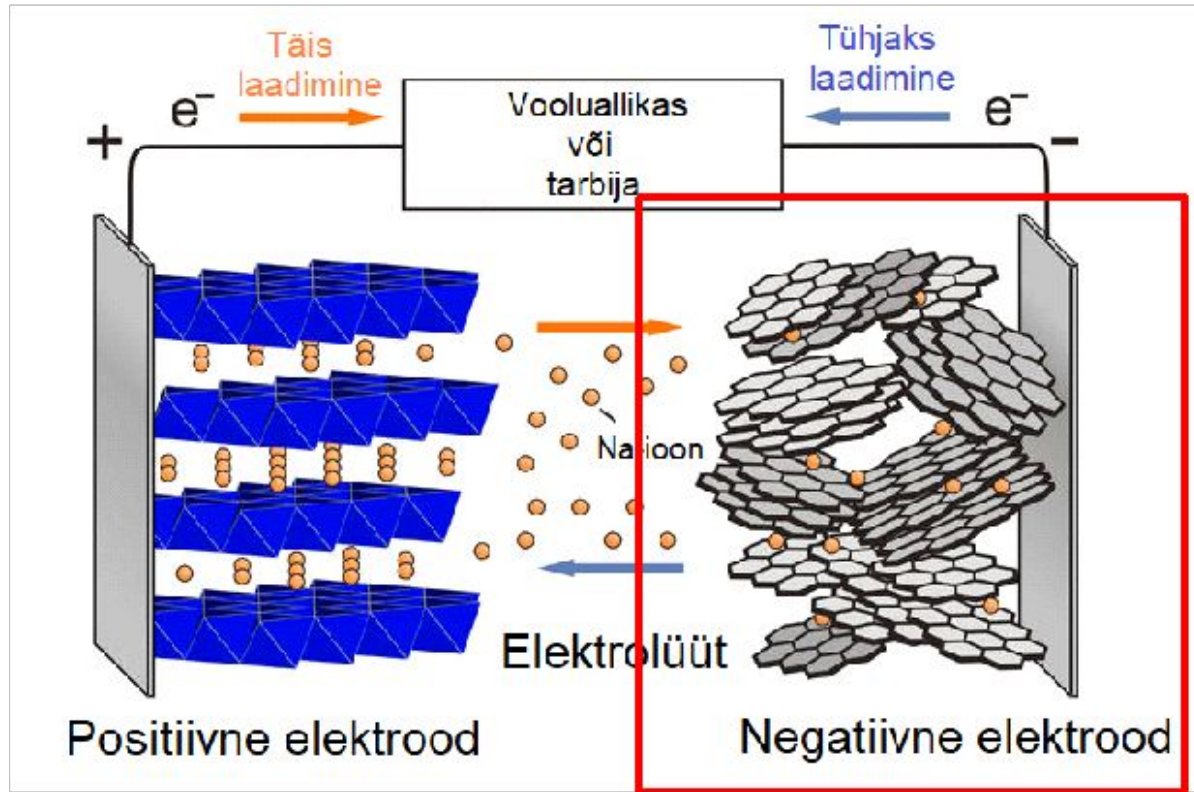


Võttakse arvesse teinud teinuvad samad reaktsioonid
 2. $\text{Li}^+ + \text{OC} = \text{LiC}_6^{1-x}$

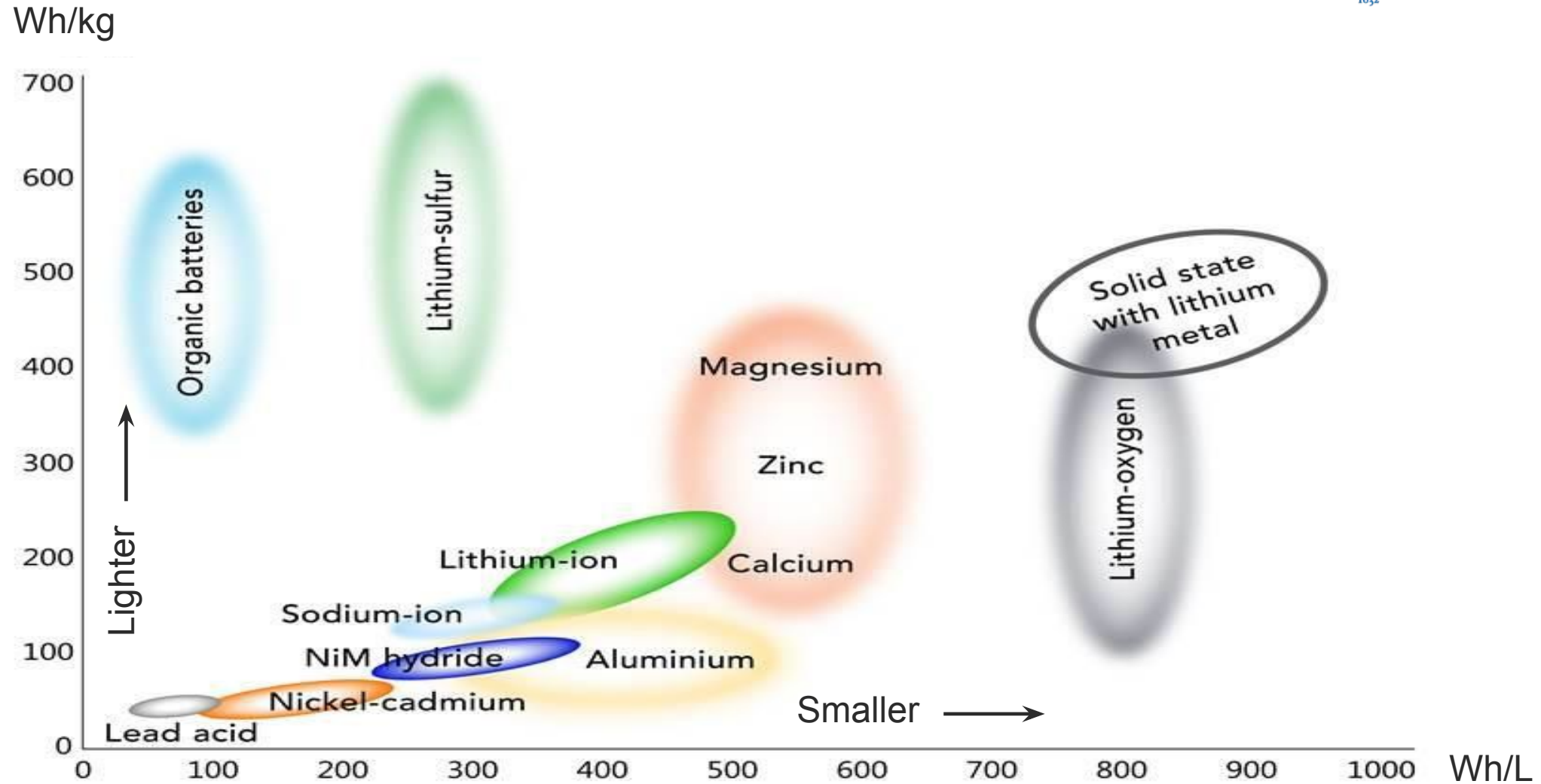
Organisatsioonistamine Li-ioonakudes



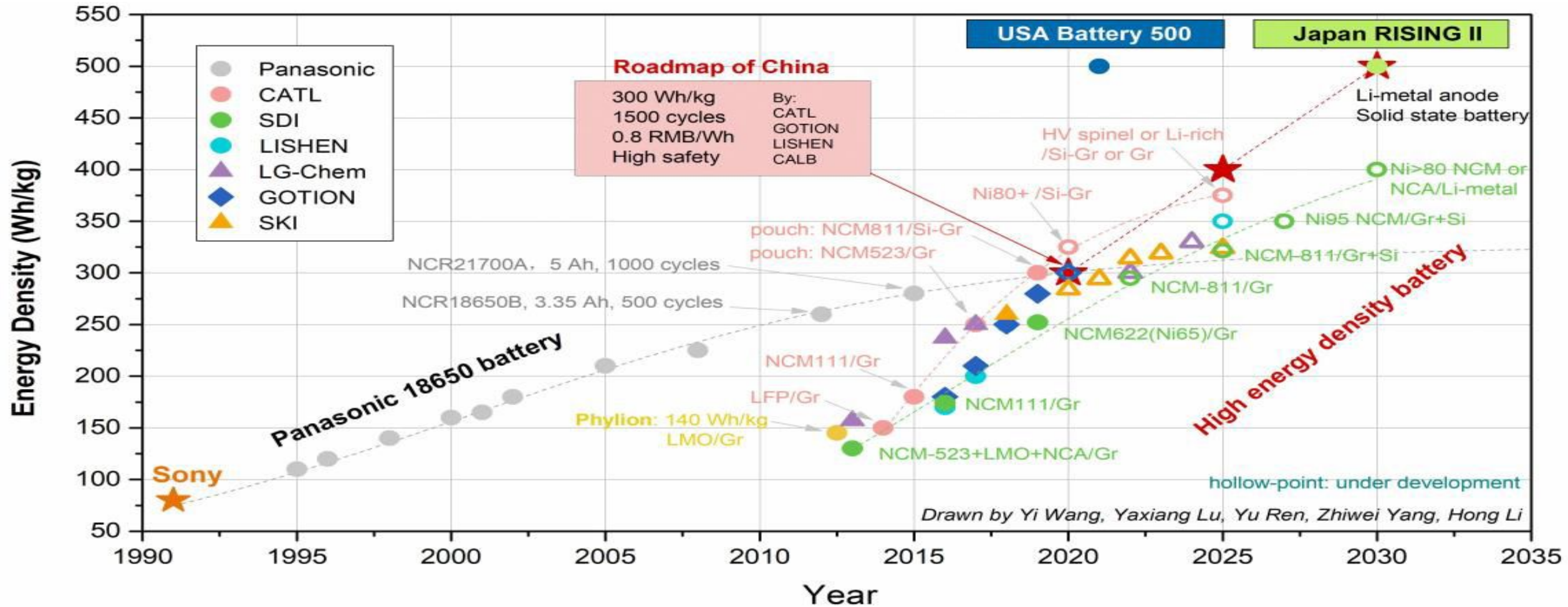
Grafiit ei sobi Na-ioonakudesse



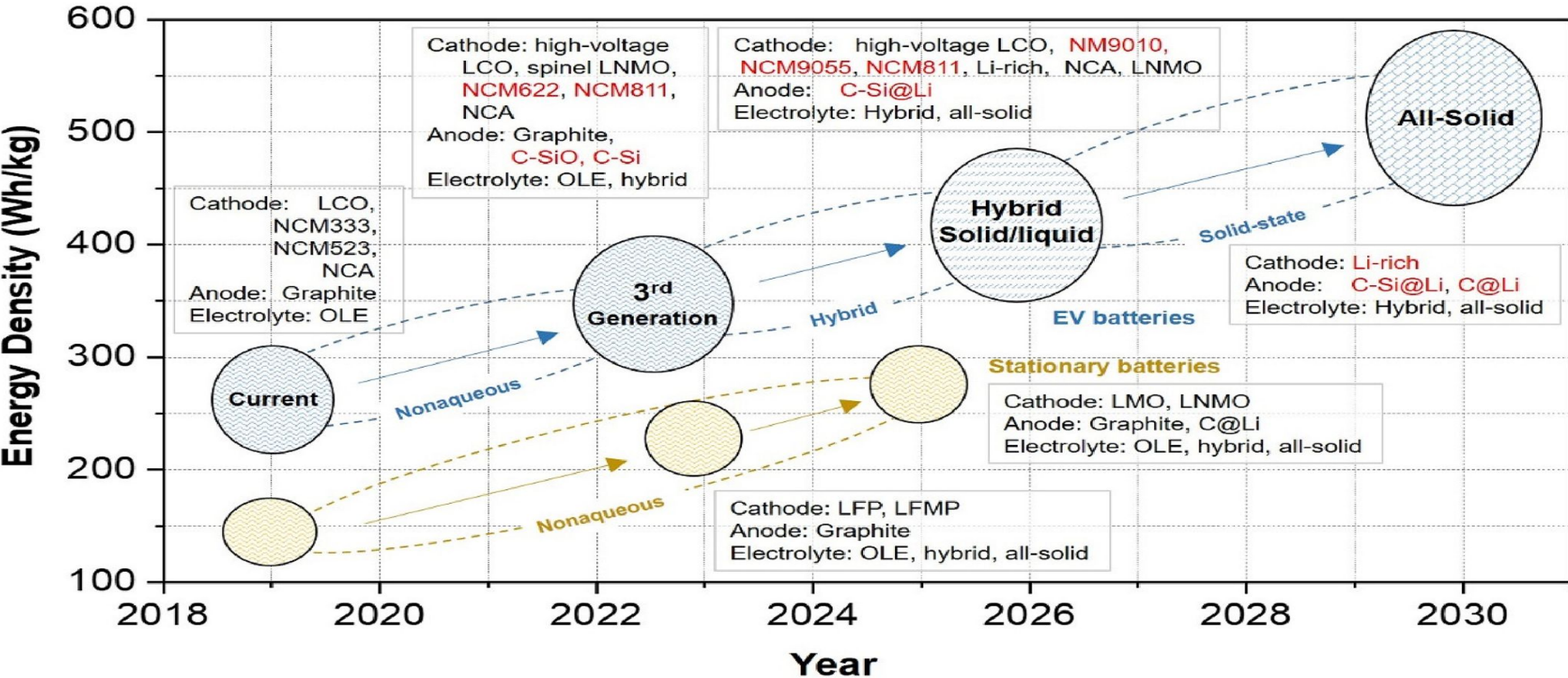
Praegused ja tulevased võimalikud akulahendused



Li-ionakude 2030+ teekaart



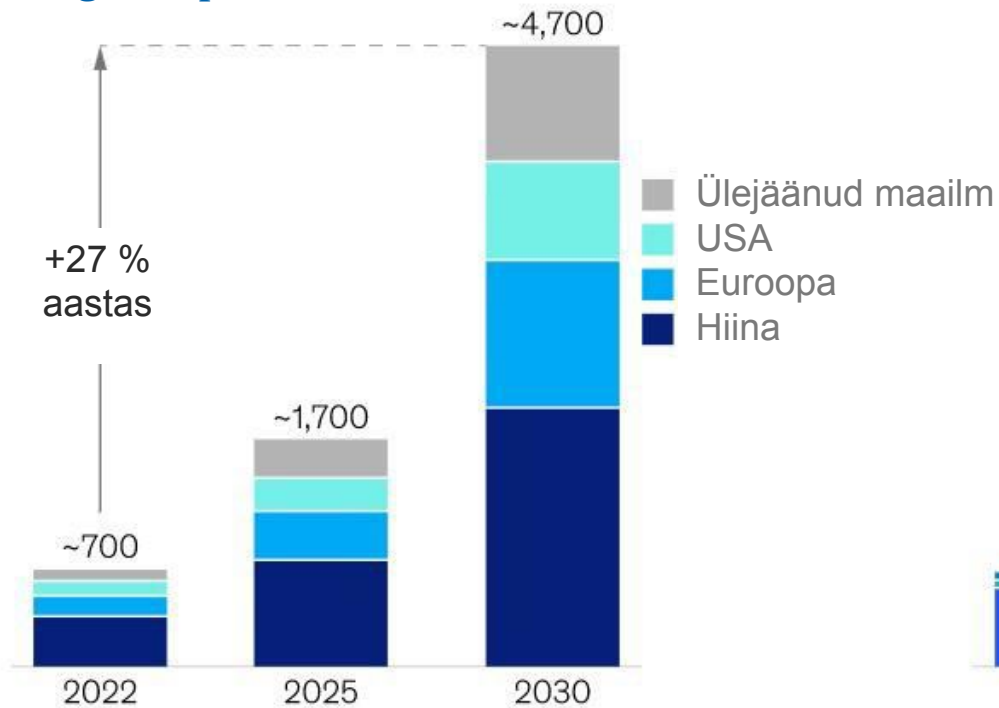
Li-ionakude arendamine



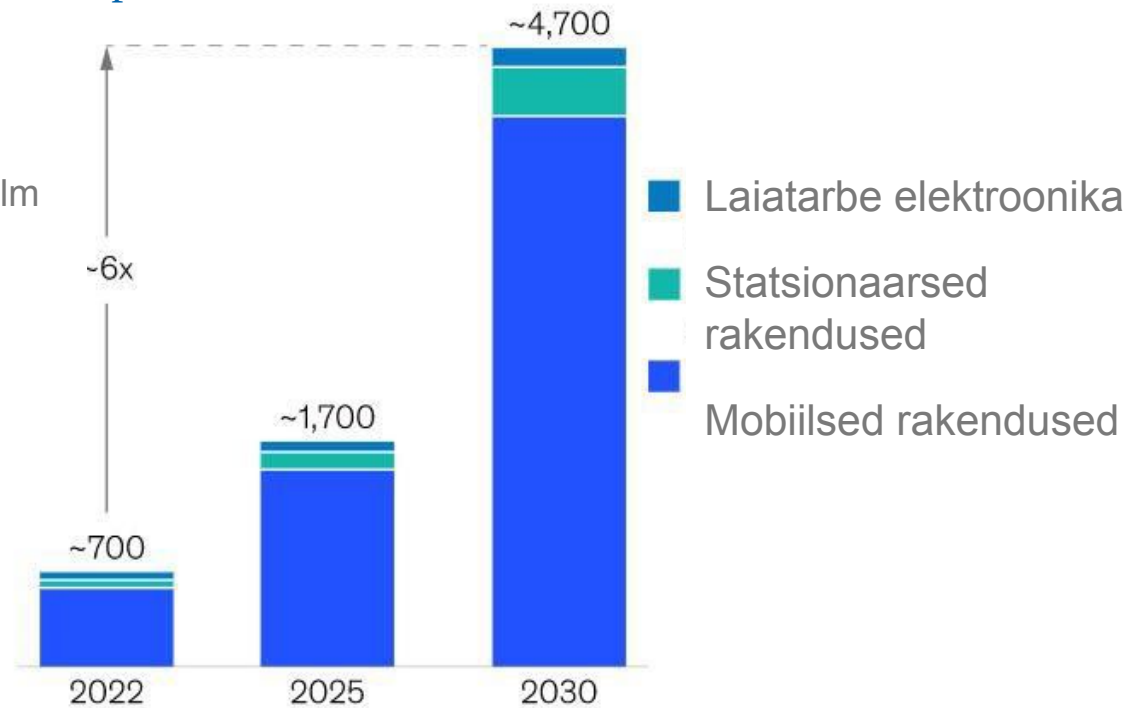
Globaalne Li-ionakude nõudlus

Eeldatakse, et Li-ionakude nõudlus jõuab 2030. aastaks umbes 4700 GWh-ni

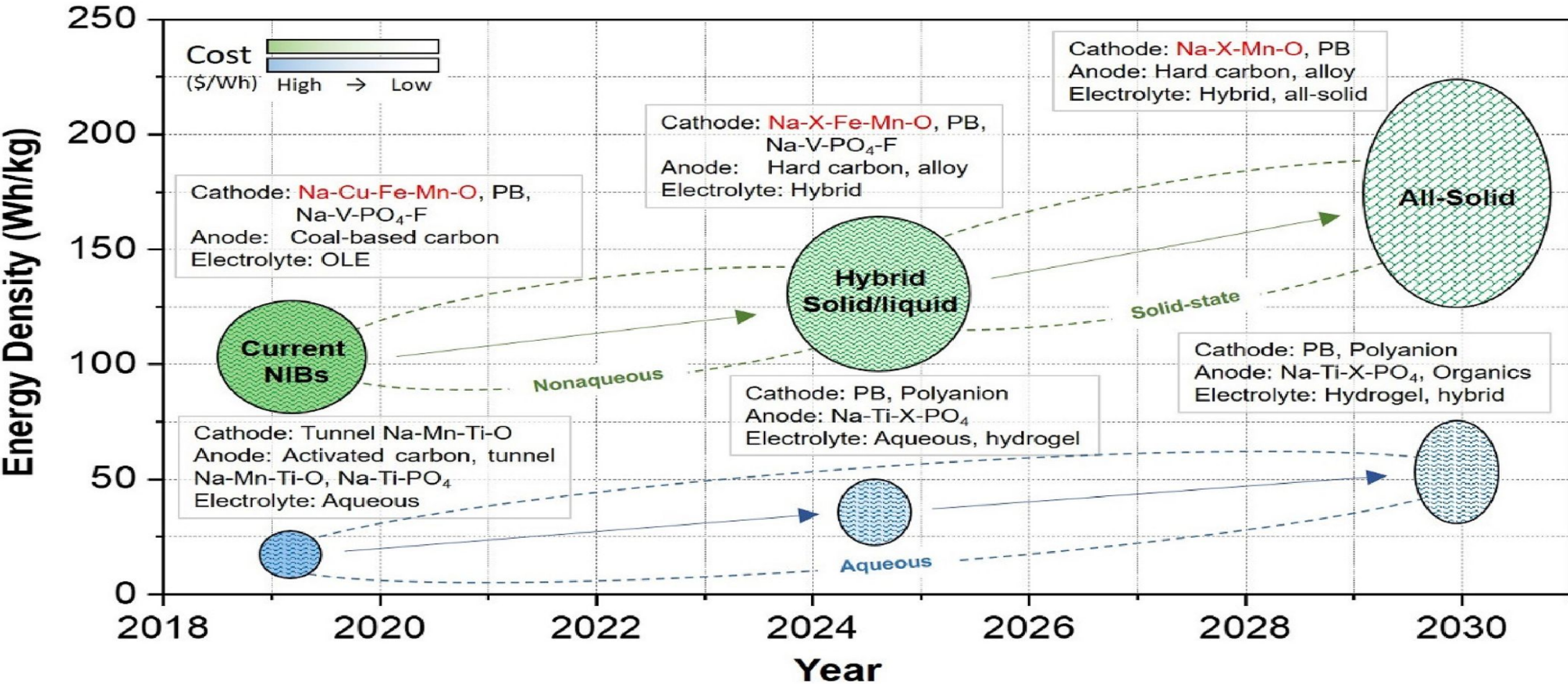
Regioonipõhine



Sektoripõhine



Na-ion akude arendamine



Superkondensaatorite edasiarendused

eelnev dopeerimine

asümmeetrilised- ja komposiitelektroodid

Li-ionakude edasiarendused

katood: Li-rikas kihiline

anood: nano-Si/C, C/Li

funktsionaalne elektrolüüt ja separaator

aku väljundpinge tõstmine

Liitiumijärgsed akukeemia lahendused

Na-ioon (Ni/Co vaba kihiline)

multivalentes metall-ioon (Al, Ca, Zn, Mg)

metall-õhk

redoks läbivoolu jne.

Täna tähelepanu eest!



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