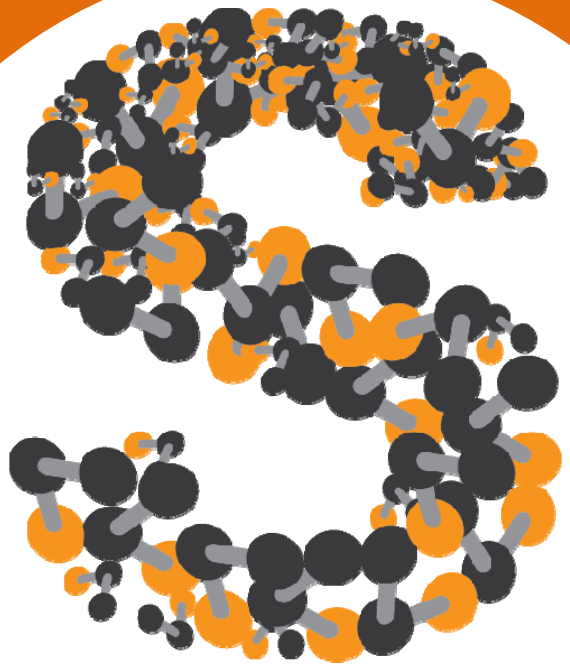
Silicon Friendly Materials and Device Solutions for Microenergy Applications



SiNERGY

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Title: Silicon Friendly Materials and Device solutions for Microenergy Applications

Acronym: **SiNERGY**

Call/topic: NMP.2013.2.2-4 Materials solutions for durable energy harvesters

Duration: 36 months

Funding: 3,794,913.00 € (4.824.460.00 €)

Partners: 9 (4 countries) - **coordinated by** Luis Fonseca (CSIC)

Officer: Erno Vandeweert - **PTA:** Marcel Dierselhuis

Goal: Silicon materials and Silicon technologies & architectures for long term autonomy microenergy solutions

Focus: (1) Technology development at device level (2) Systems integration feasibility

Devices: (1) Harvesters based on thermoelectrics (2) Harvesters based on mechanical vibrations (3) thin film / 3D batteries

Application scenarios: (1) Tire Pressure Monitoring (2) Predictive maintenance

Why microenergy solutions: Replace primary batteries (cost, environmental, deployment flexibility issues) by harvesters + secondary batteries

Why Silicon materials and architectures: tap into the micro-nanoelectronics field which is an enabling technology, dealing with miniaturised and high density features (3D) implementations, offering economy of scale (serve mass markets) and the possibility of integration and addition of control and smartness

Why such applications: complementary microenergy testbeds from the perspective of silicon benefits ('smaller is better', 'cheaper is better') and availability of energy harvesting sources:

- Predictive maintenance

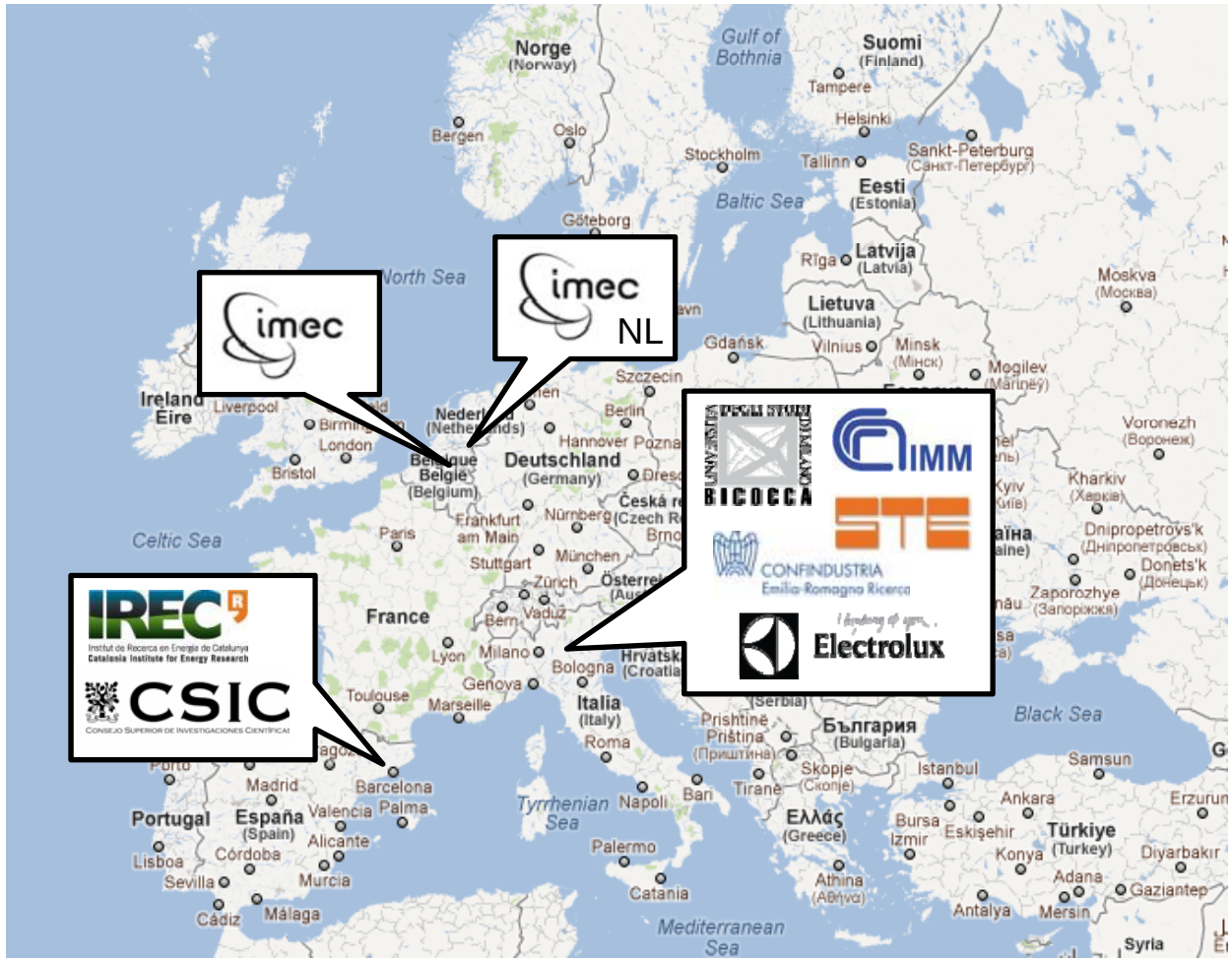
Rotating-reciprocating machines
Large shop floors
High number of nodes
Difficult servicing

Test-bed for vibrations and thermal harvesting

- Tire Pressure monitoring

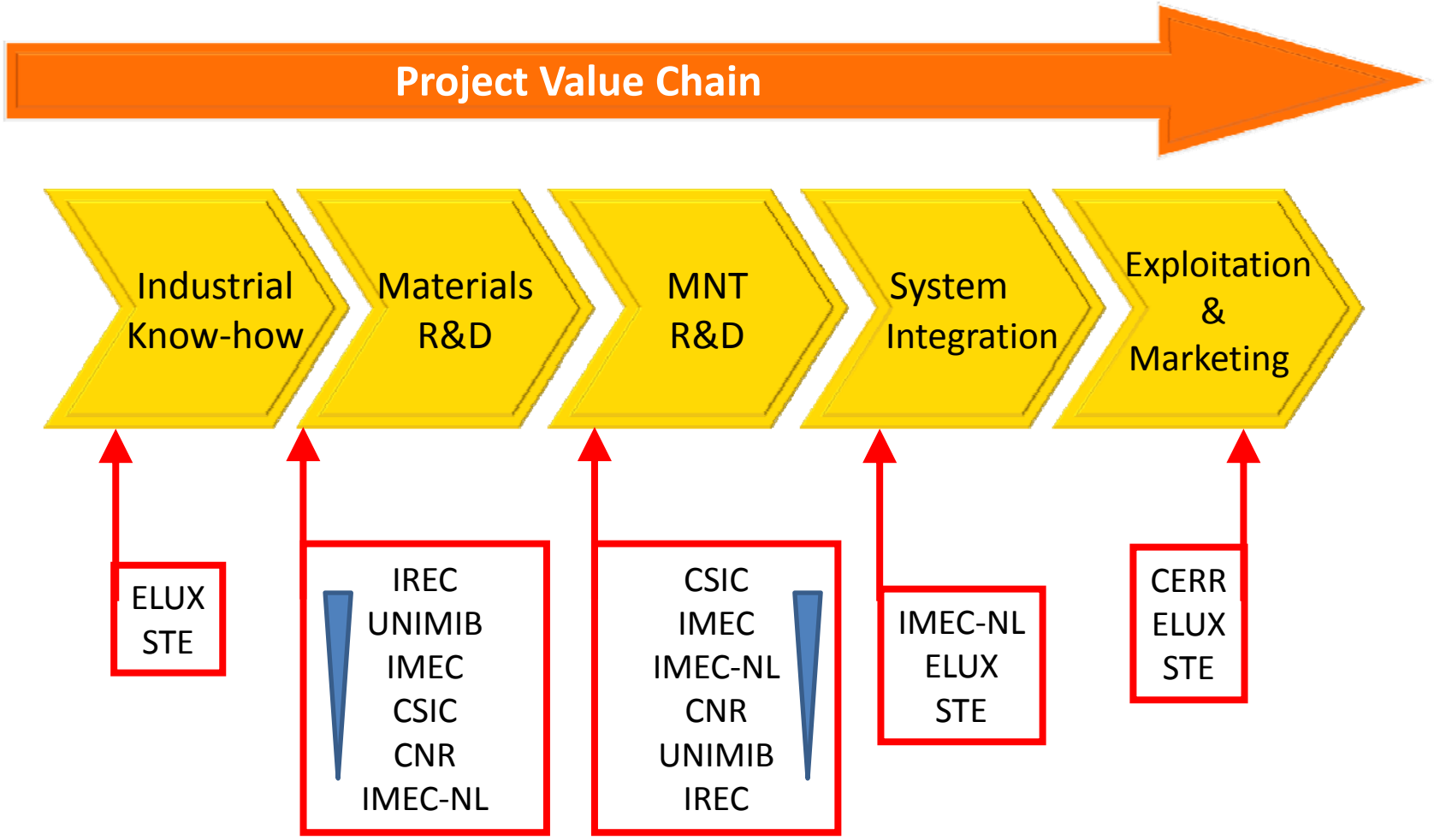
Intelligent tire
Large market volume
Small size

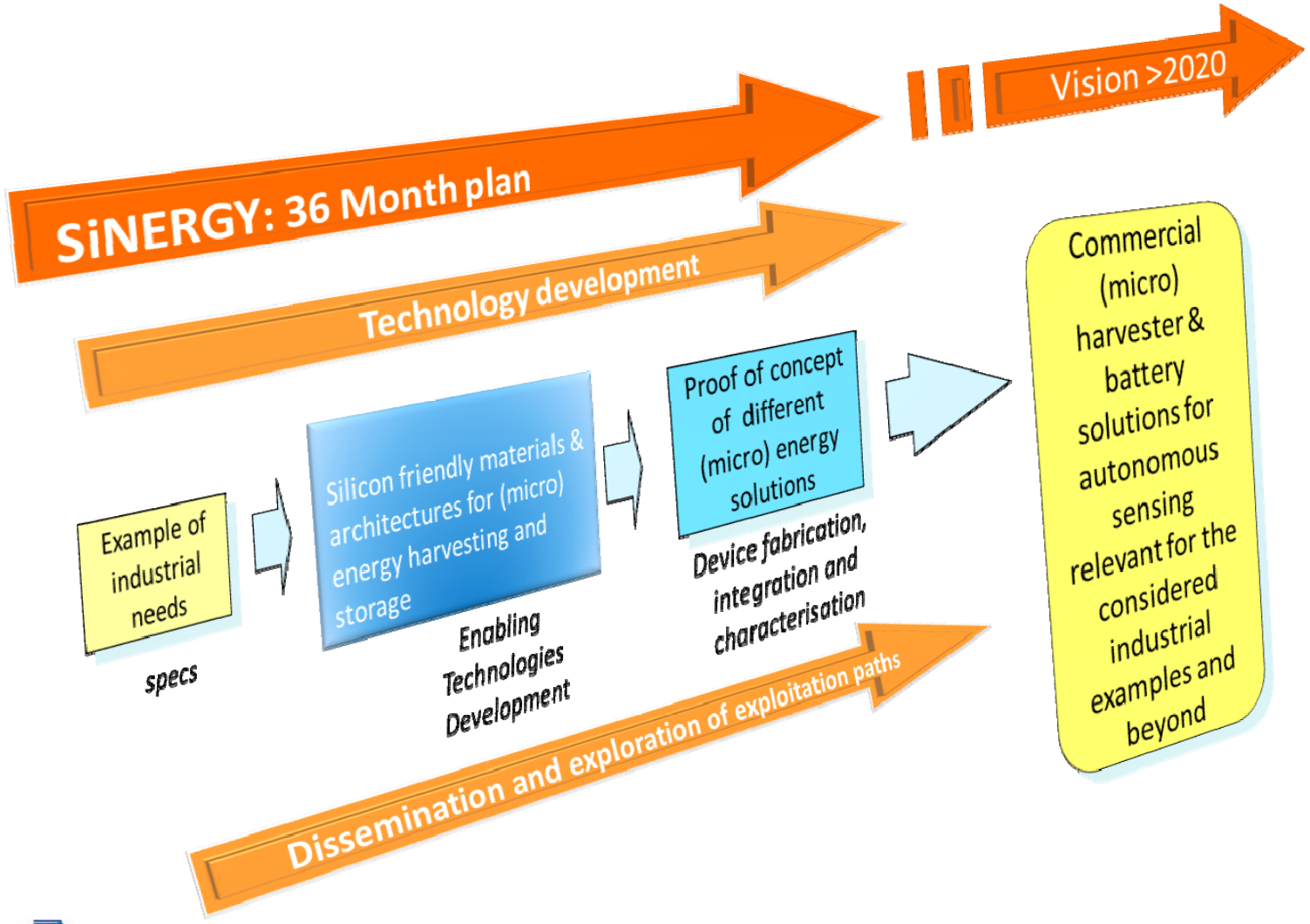
Test-bed for vibration harvesting

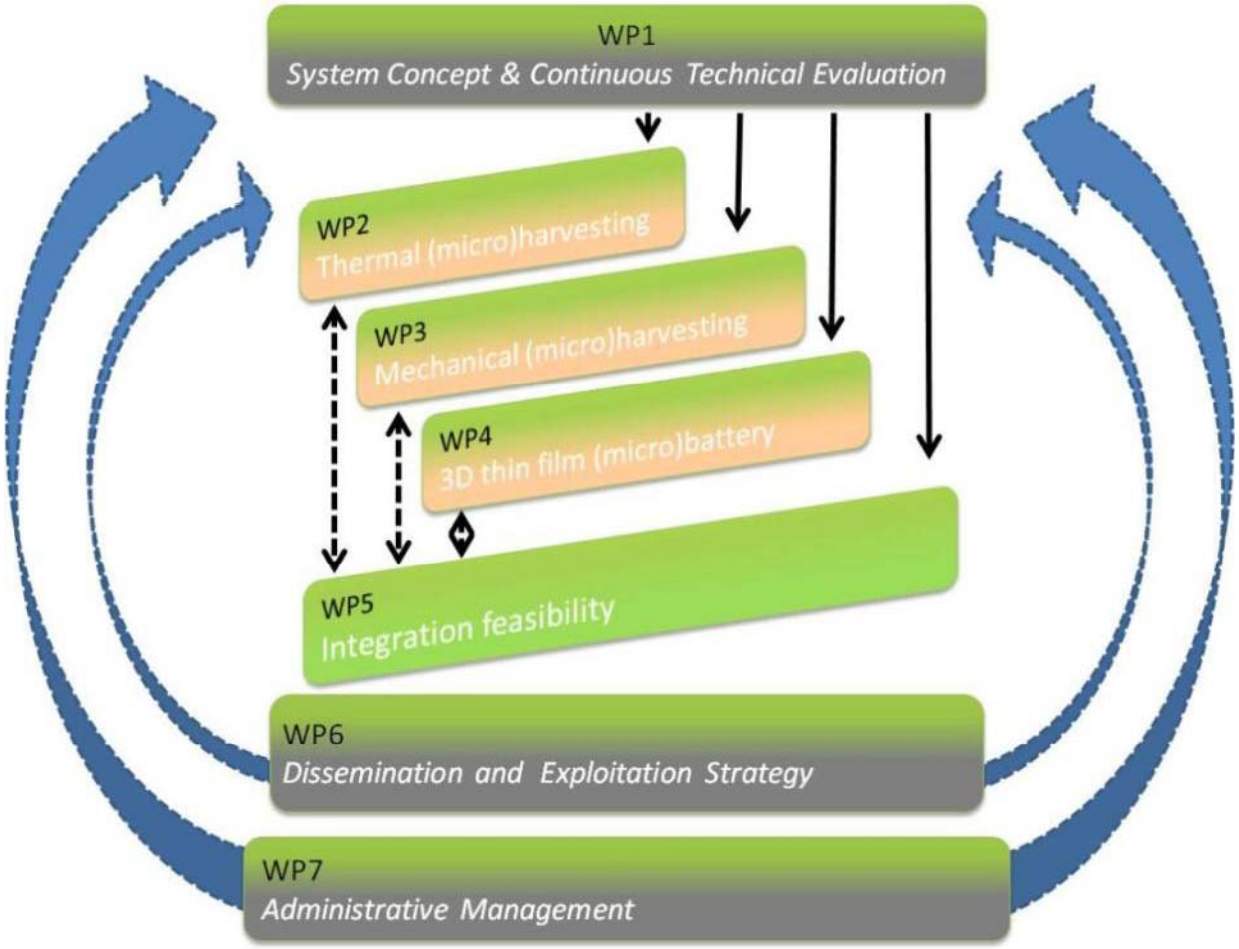


9 partners
(E, I, BE, NL)

Coordinator:
CSIC
(IMB-CNM)

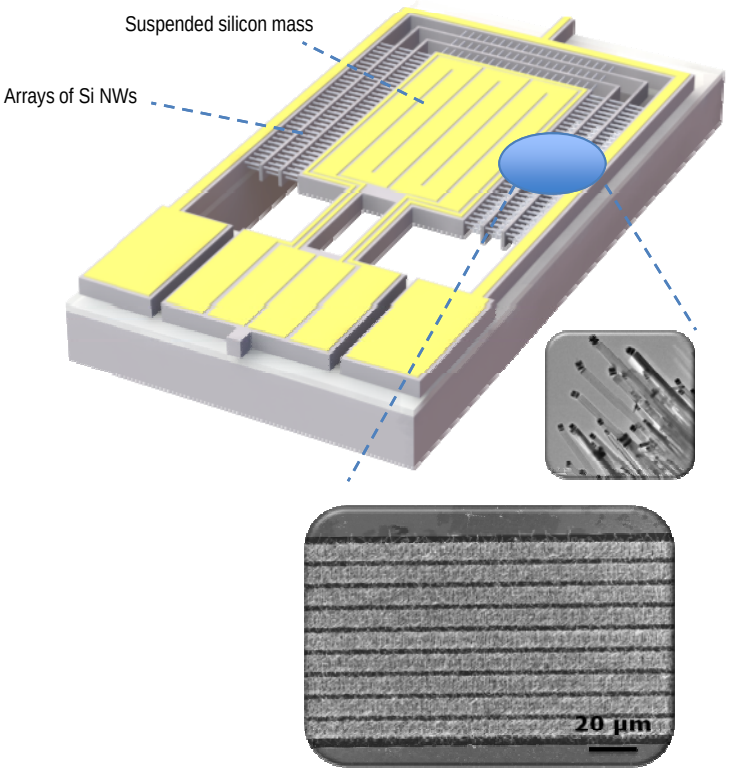

Project Value Chain
Industrial Know-how
Materials R&D
MNT R&D
System Integration
Exploitation & Marketing
ELUX
STE
IREC
UNIMIB
IMEC
CSIC
CNR
IMEC-NL
CSIC
IMEC
IMEC-NL
CNR
UNIMIB
IREC
IMEC-NL
ELUX
STE
CERR
ELUX
STE


Vision >2020
SiNERGY: 36 Month plan
Technology development
Example of industrial needs
specs
Silicon friendly materials & architectures for (micro) energy harvesting and storage
Enabling Technologies Development
Proof of concept of different (micro) energy solutions
Device fabrication, integration and characterisation
Commercial (micro) harvester & battery solutions for autonomous sensing relevant for the considered industrial examples and beyond
Dissemination and exploration of exploitation paths

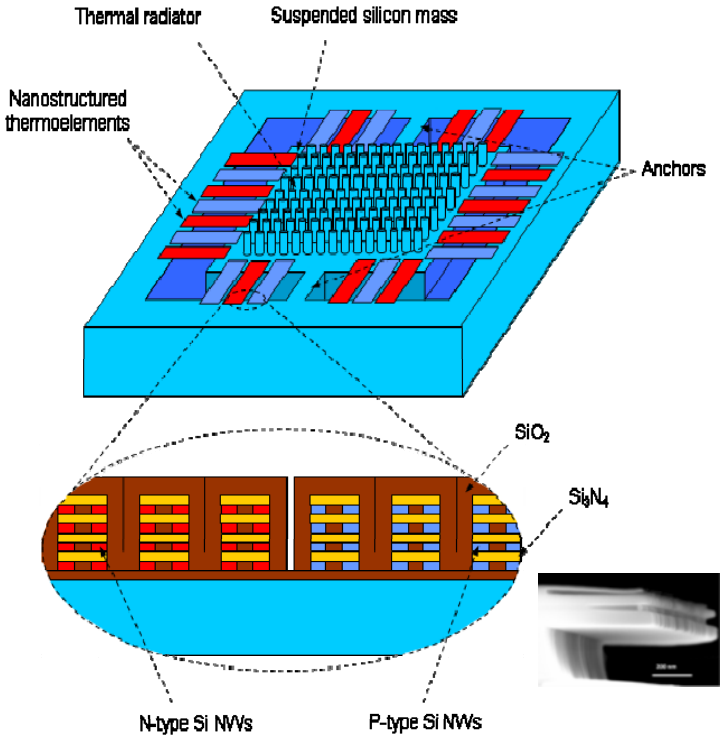


WP1: CSIC
WP2: UNIMIB
WP3: IMEC-NL
WP4: IMEC
WP5: IMEC-NL
WP6: CERR
WP7: CSIC

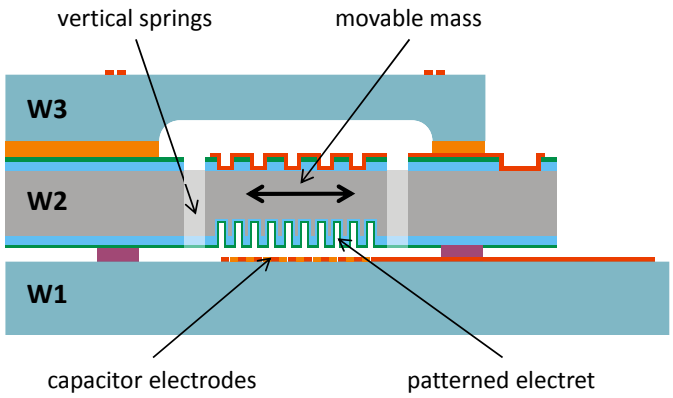
- 3D microstructures
  + bottom-up SiNWs

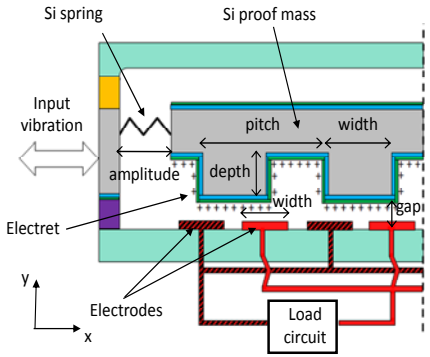


- 3D microstructures
  + top-down SiNWs

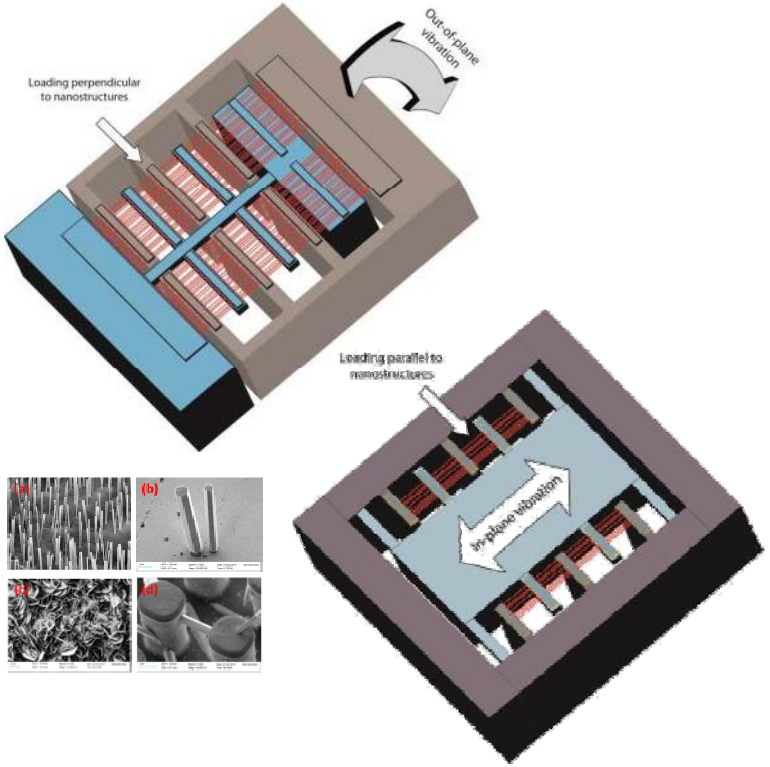


- 3D microstructures + electrostatic





- 3D microstructures + piezoelectric



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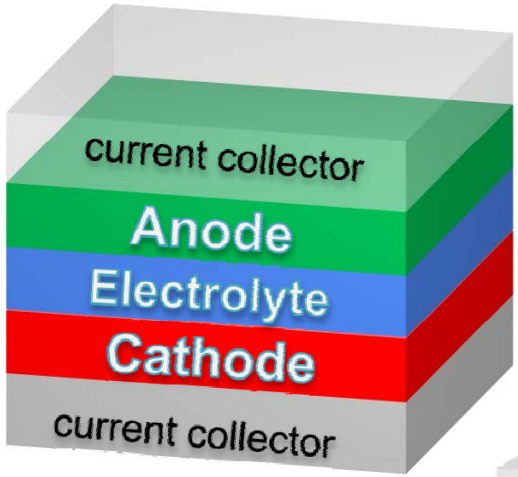
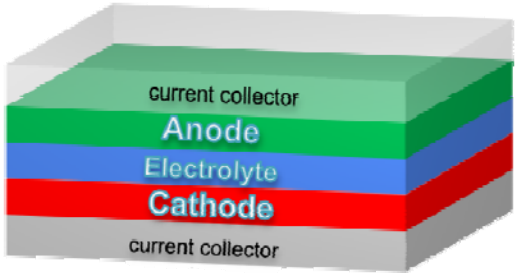
- Materials for Si compatible batteries



Thin film

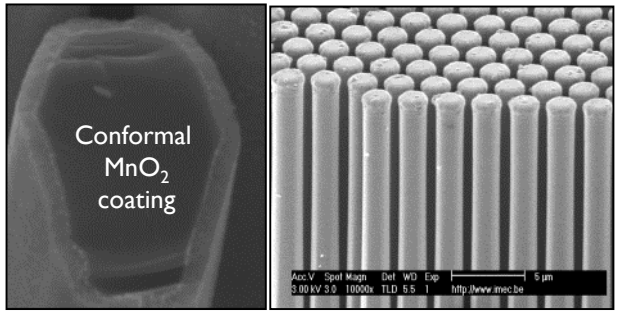
Low capacity
High power



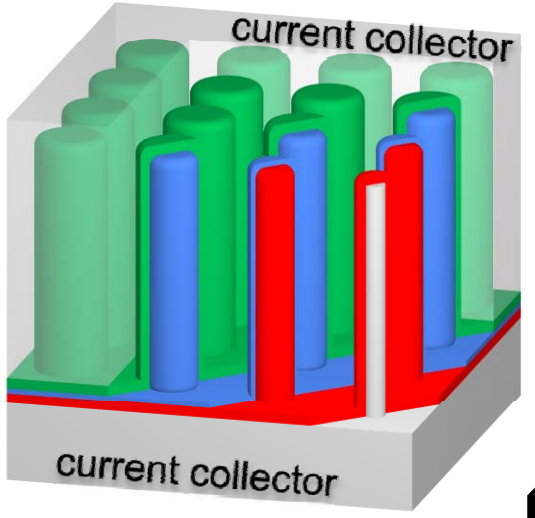
High capacity
Low power

3D

- 3D microstructures



High capacity & power



NMP3-SL-2013-604169

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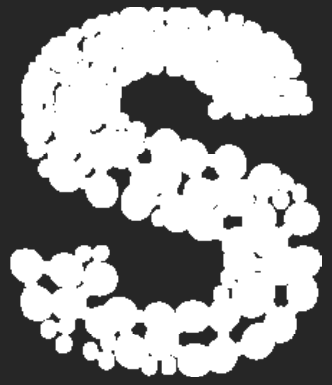

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