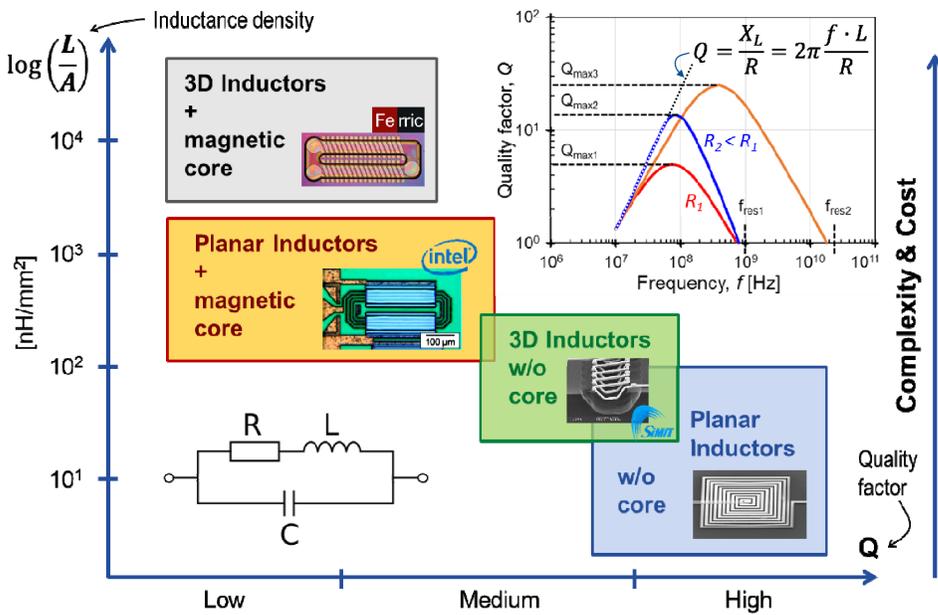


## Key Contributions

- We provide an industrial sputtering solution to manufacture magnetic cores for integrated power converters & RF passives.
- We manufactured integrated magnetic inductors on 200 mm high-resistivity silicon wafers (BEOL process) with a record inductance surface density (~3500 nH/mm<sup>2</sup>) & Q-factors of ~23.

## Introduction & Motivation

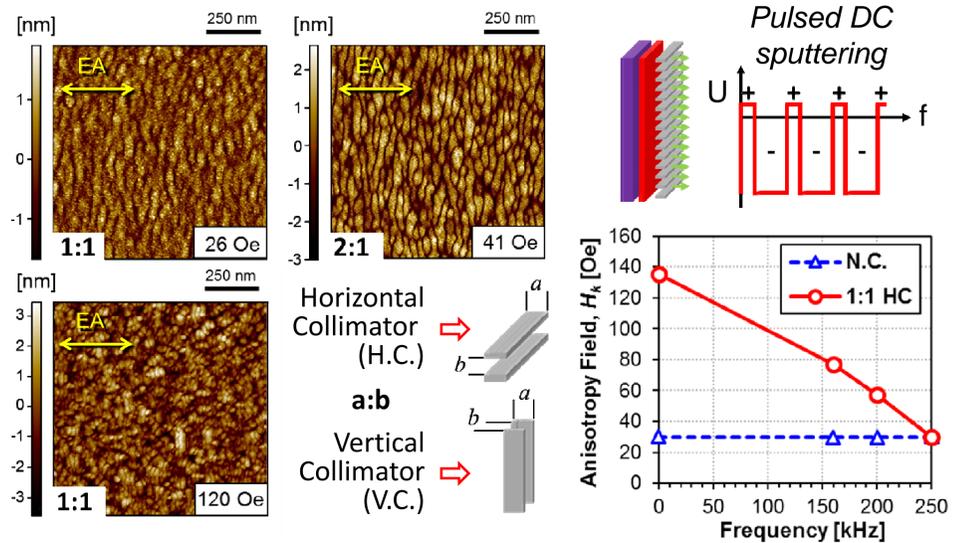
Integrated magnetic cores based on soft magnetic thin films promise significant miniaturization for power systems on chip converters and RF components.



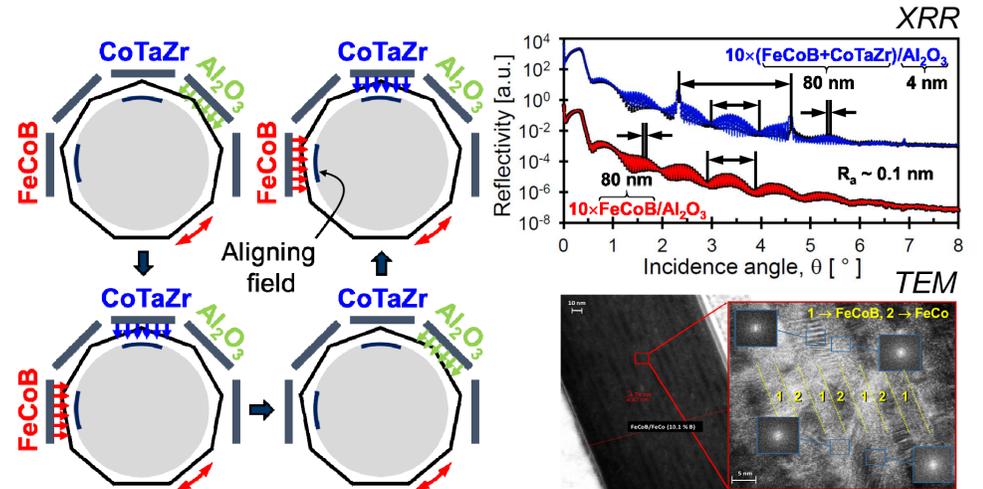
## Tailored Soft Magnetic Thin Films

Besides the appropriate choice of soft magnetic and dielectric materials, and layer thickness, further tailoring of the physical properties (e.g. in-plane anisotropy, magnetostriction, permeability, FMR frequency, electrical resistivity) can be done by [2-5]:

### Tuning the Angular Distribution and Process Parameters

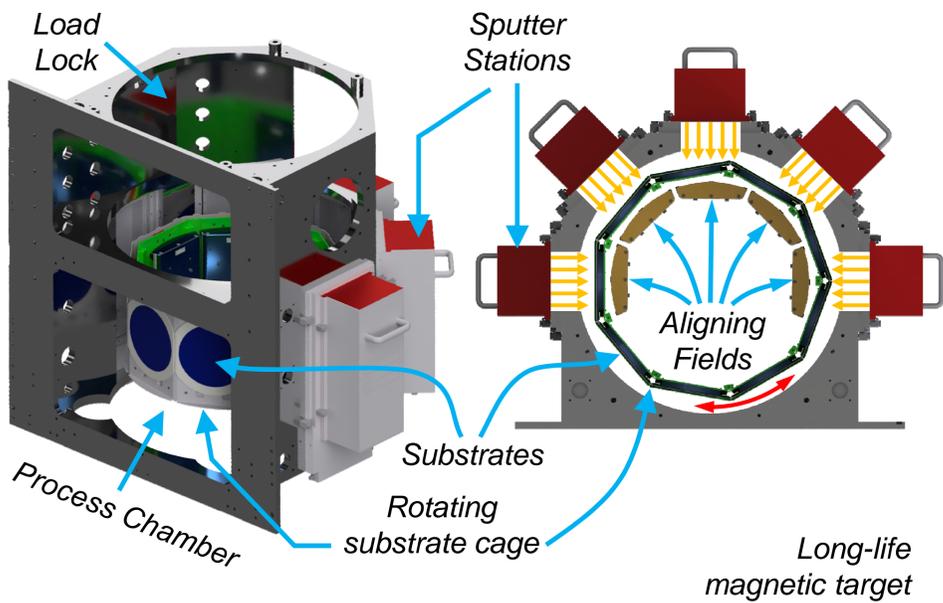


### Nanolayering the Magnetic Sublayers

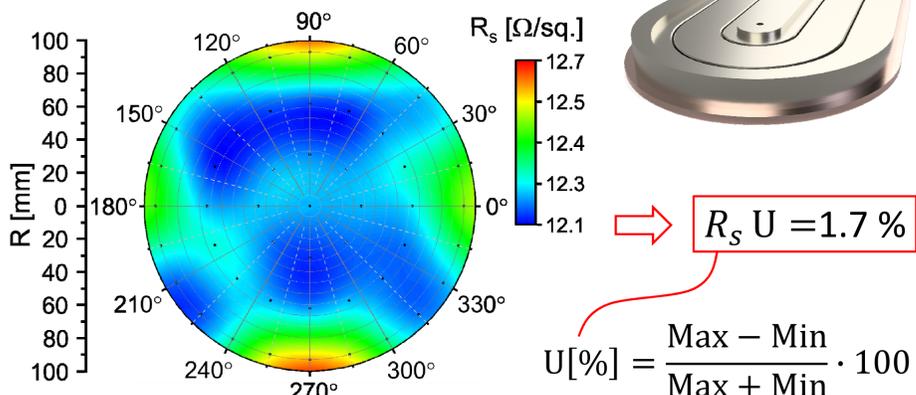


## Load Lock Sputter System (LLS EVO II)

High-throughput PVD system: 5 sputter stations, shutter, aligning fields, rotating substrate cage, long-life (~250 kWh) targets  $\Rightarrow$  up to 900 wafers with 1  $\mu$ m thick film (thickness uniformity < 2% for 8"). System can be scaled up for 300 mm wafers [1].

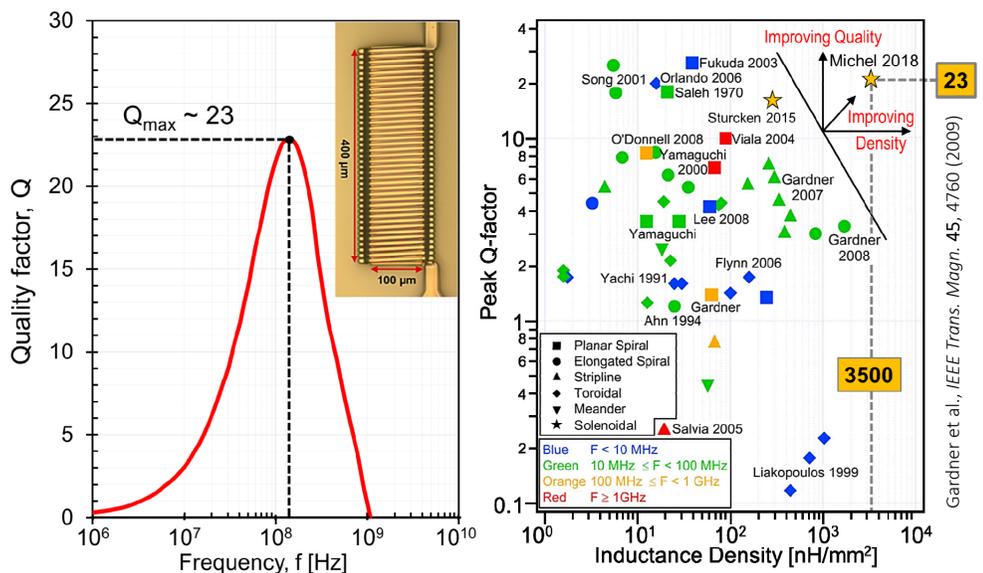


Sheet resistance ( $R_s$ ) distribution for 100 nm CoTaZr film on 8" Si/SiO<sub>2</sub>



## Integrated Magnetic Inductors with High Q-Factor

Ultra-low profile (i.e. 100  $\mu$ m thick) integrated magnetic solenoid inductors with a record inductance surface density of 3500 nH/mm<sup>2</sup> and Q-factors of ~23 were fabricated at CEA Leti [6].



## Further Information

- <https://www.evatecnet.com/products/lls-evo-ii>
- C.V. Falub et al. *AIP Advances* **7**, 056414 (2017)
- C.V. Falub et al. *IEEE Trans. Magn.* **53**, 2002906 (2017)
- C.V. Falub et al. *AIP Advances* **8**, 048002 (2018)
- R. Hida et al. *J. Magn. Mag. Mater.* **453**, 211 (2018)
- J.-P. Michel et al. (submitted)

**CONTACT**  
Tel: +41 81 403 80 00  
E-mail: info@evatecnet.com  
www.evatecnet.com