



RawMaterials

RM@Schools

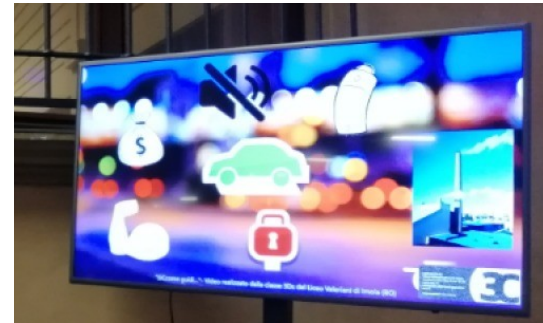
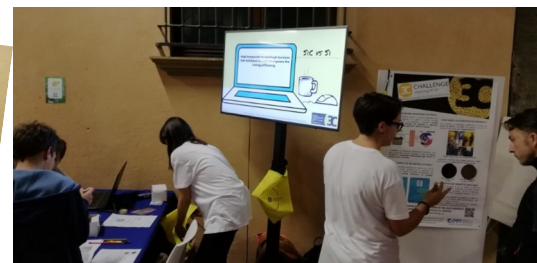


«Challenge» is a research project funded under Horizon 2020, the European Framework Programme for Research and Innovation. It is coordinated by CNR with the cooperation of 13 European + 1 Japanese partner.

Challenge aims at depositing Silicon Carbide (SiC) on Silicon (Si) substrates to open the way to sustainable wide-band-gap power electronics.



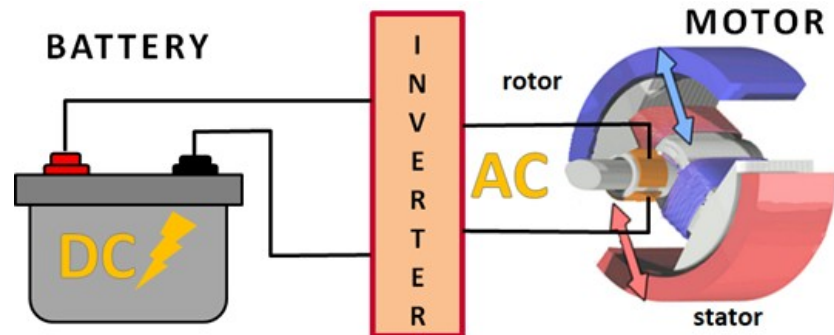
Students from the high school "L. Valeriani" near Bologna (IT) tested a new learning pathway focused on power electronics for electric cars developed in collaboration between Challenge and RM@schools to raise wider awareness on the impact of power electronics to save energy.



They realized a video on SiC applications, named "SiCcome guidi" (in English it sounds like "SiNce you drive a car") and took part in the European Researchers Night in Bologna.

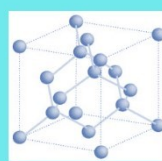
WORKING PRINCIPLES OF ELECTRIC MOTORS

An electric motor is composed by a rotating part, called rotor, and a fixed part called stator. The rotation is maintained by supplying the rotor with an alternating current (AC). **Since the battery can supply direct current (DC), a conversion to AC must be operated by an electronic device called inverter.**



The **inverter is a power device**, since it has to sustain $V > 600V$ without heating or breaking. **SiC, compared to Si, is the ideal material to make inverters for electric cars.**

SILICON

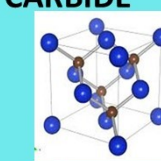


Element : **Si**

High voltage	★★
Heat resistance	★
Price	★
Abundance	★★★★
Lifetime	★★★★★

Use: PC, solar cells

SILICON CARBIDE



Element : **SiC**

High voltage	★★★★★
Heat resistance	★★★★★
Price	★★★★★
Abundance	★★★★
Lifetime	★★★

Use: electric cars, wind turbines

FABRICATION OF ELECTRONIC DEVICES

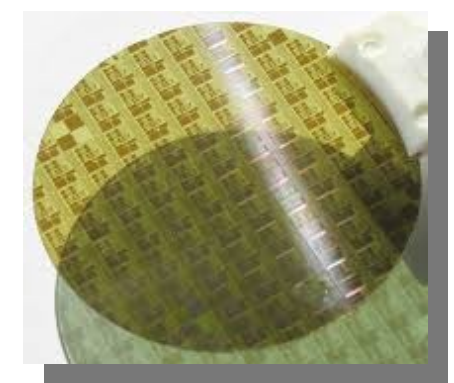
Electronic circuits are fabricated on a thin disc called «**wafer**». Since a high device density reduces price, electronic circuits are very small in size. They are fabricated in **clean rooms**, i.e. laboratories where dust has been eliminated.



Clean room class 100 at CNR IMM



SiC wafer

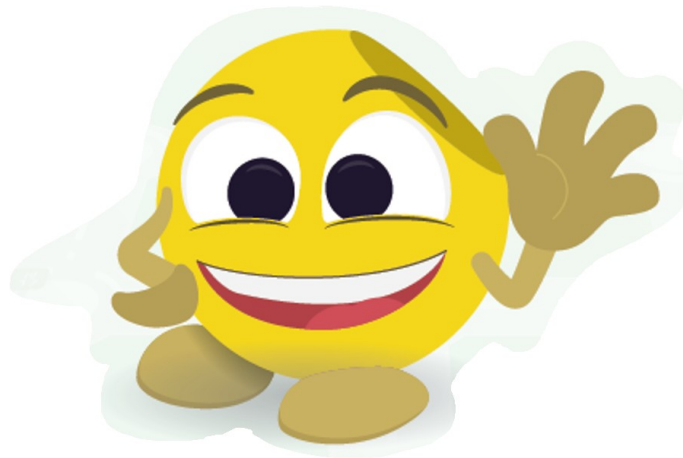


SiC wafer with chips

IDEAS AND SCOPE OF THE «CHALLENGE» PROJECT

- 1) **Decrease SiC price** by depositing SiC layers on Si wafers.
 - 2) **Eliminate interface defects** by engineering the Si substrate in a way to reduce lattice mismatch between Si and SiC.
- This allows to exploit the mature Si industry to obtain high quality and low cost SiC devices.

«**Challenge maze**» is a serious game used as supporting material for the learning pathway «Electronics for electric cars». It is developed by the Challenge Consortium. The main character, “SiC”, is a powerful material who found a job in the motor of an electric car with the task of making the electric car more efficient.. By playing this test the users can **discover how researchers are helping SiC facing this Challenge.**



HELP SIC ESCAPE THE LABYRINTH
SCAN THE QR CODE OR VISIT
<http://game.h2020challenge.eu>
