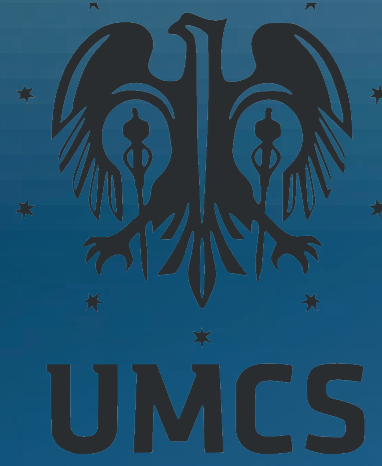


THE EFFECT OF OXYGEN PLASMA CLEANING PROCESS ON WETTABILITY OF SILICON (100) SURFACE

MICHAŁ CHODKOWSKI¹, KONRAD TERPIŁOWSKI¹



¹Department of Interfacial Phenomena
Institute of Chemical Sciences, Faculty of Chemistry
Maria Curie-Skłodowska University in Lublin
Plac Marii Curie-Skłodowskiej 3, 20-031 Lublin, Poland
michal.chodkowski@poczta.umcs.lublin.pl



THE AIM:

A silicon wafer (also called a slice or substrate) is a thin slice of a crystalline silicon used for the fabrication of integrated circuits and in photovoltaics to manufacture solar cells. It undergoes many microfabrication processes, such as doping, ion implantation, etching, thin-film deposition of various materials, and photolithographic patterning. The objective of this work was to examine the effect of oxygen cold plasma cleaning of silicon (100) surface on its wettability.

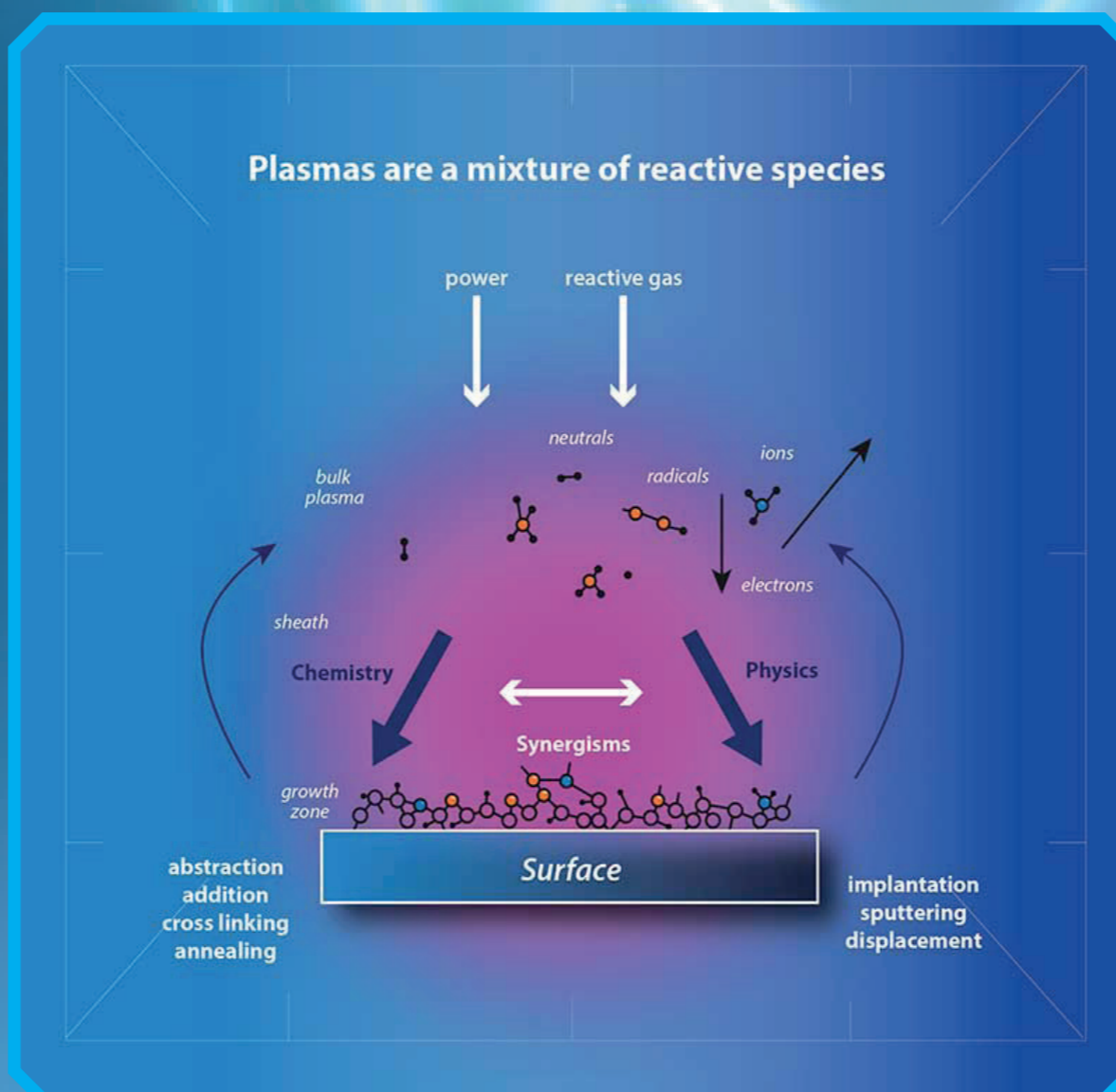


Fig. 1: The scheme of a plasma action on the surface.

XPS ANALYSIS:

The XPS analysis was made before the plasma cleaning process in order to investigate the qualitative composition of the surface.

PLASMA CLEANING:

The surface was cleaned by means of the Pico system from Diener Electronic (Germany) using cold plasma at low pressure.

Gas: Oxygen, rate 100 %
Gas flow: 50 sccm
Process pressure: 0.4 mbar
Power of generator: 100 % (500 W)

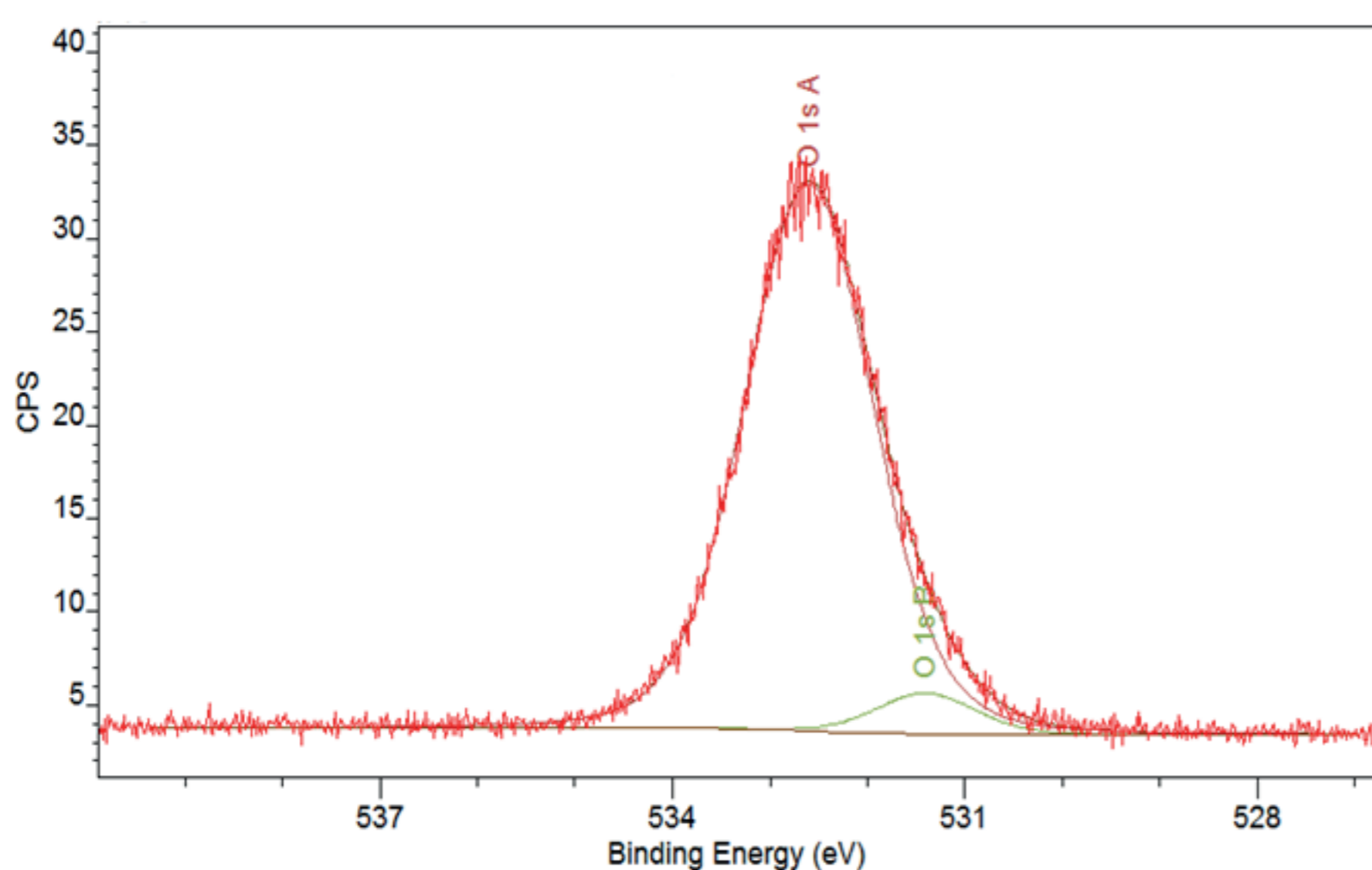


Fig. 2: XPS O_{1s} signals of the silicon (100) surface.

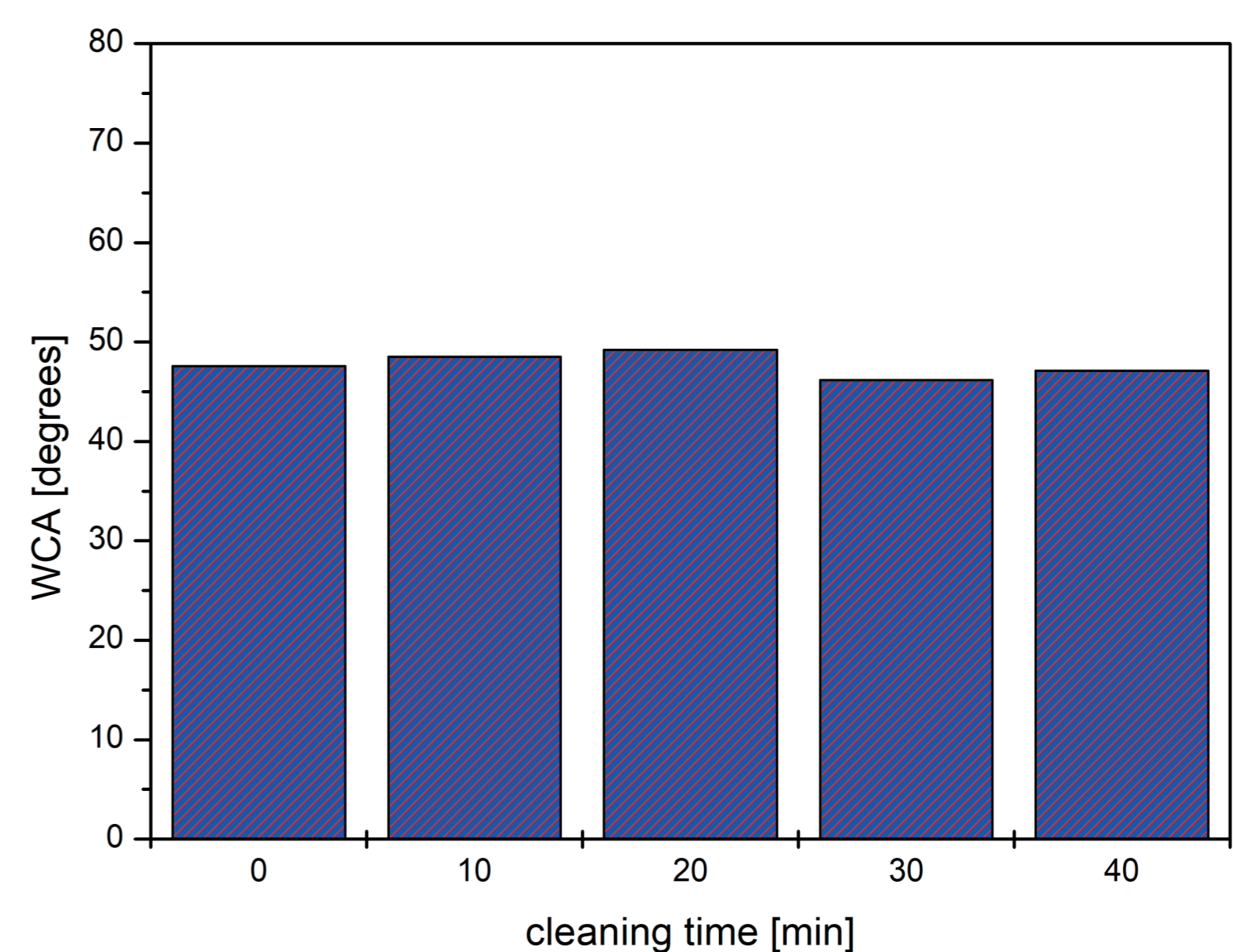


Fig. 3: Water contact angles (WCA) on the silicon (100) surface after plasma processing.

CONCLUSIONS:

- ✓ the XPS analysis confirmed the presence of the oxide on the silicon (100) surface;
- ✓ the oxygen plasma cleaning is not able to oxidize the oxide layer on silicon (100) surface;
- ✓ as a result of the process, the contact angle remained virtually unchanged (water contact angle on silicon (100) is equal about 47.6° at 25°C).