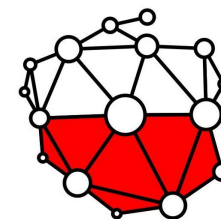




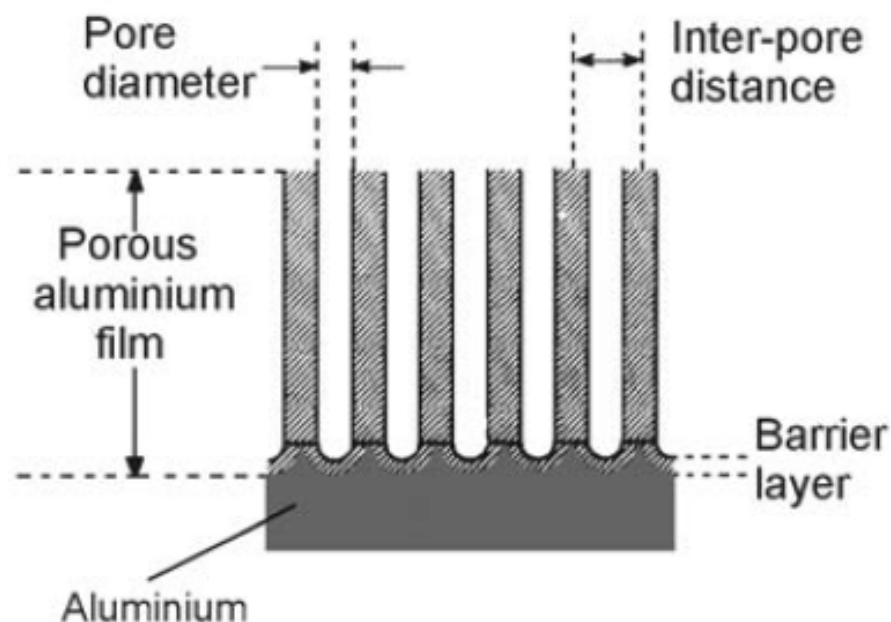
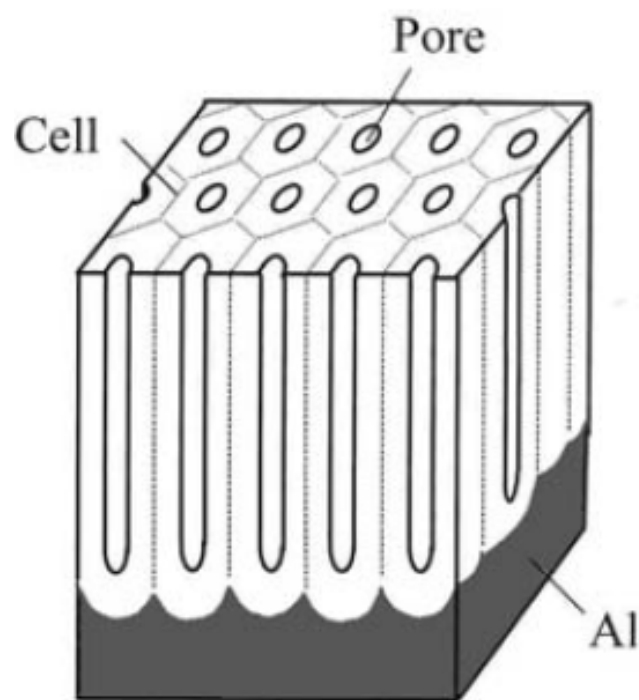
Wydajna synteza nanoporowatych membran z anodyzowanego aluminium z w pełni kontrolowanymi parametrami budowy

Wojciech J. Stępniewski, Zbigniew Bojar
Wojskowa Akademia Techniczna
Wydział Nowych Technologii i Chemii
Katedra Zaawansowanych Materiałów
i Technologii



nano
TECHNOLOGIA PL

Czym jest anodyzowane aluminium?



G. D. Sulka, *Highly ordered anodic porous alumina formation by self-organised anodising and template-assisted fabrication of nanostructured materials*, w: *Nanostructured Materials in Electrochemistry*, Ali Eftekhari (Ed.), Wiley-VCH

Jak otrzymać AAO?



H. Asoh, K. Nishio, M. Nakao, T. Tamamura, H. Masuda *J. Electrochem. Soc.*, **148** (4), (2001), B152-B156

H. Asoh, S. Ono, T. Hirose, M. Nakao, H. Masuda, *Electrochim. Acta* **48**, (2003), 3171-3174

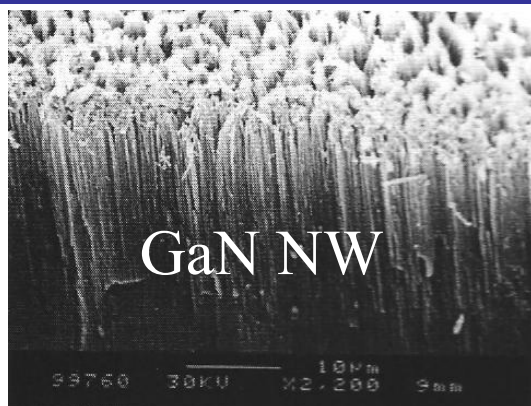
H. Masuda, H. Asoh, M. Watanabe, K. Nishio, M. Nakao, T. Tamamura, *Adv. Mater.* **13** (2001), 189-192

H. Masuda, *Ordered Porous Nanostructures and Applications*, edited by Ralf B. Wehrspohn (Springer, New York, 2005), 37-55

W jakim celu?

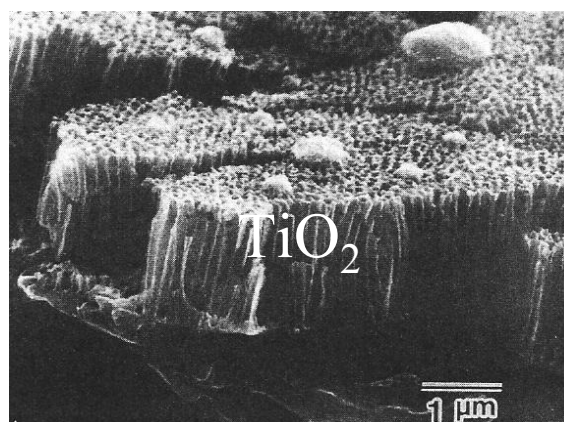
Zastosowania

Nanodruty,
nanorururki,
nanokropki



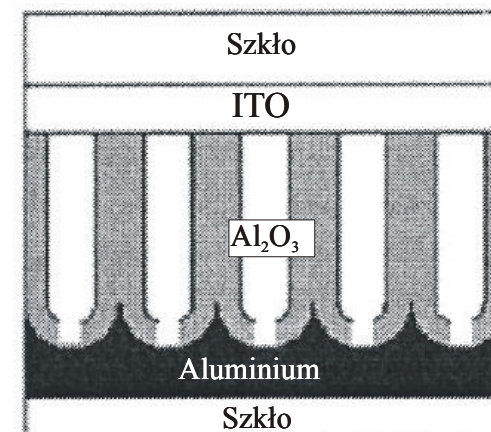
G.S. Cheng, S.H. Chen, X.G. Zhu, Y.Q. Mao, L.D. Zhang, *Mater. Sci. Eng.* **A286** (2000) 165-168

Transfer porowatej
struktury



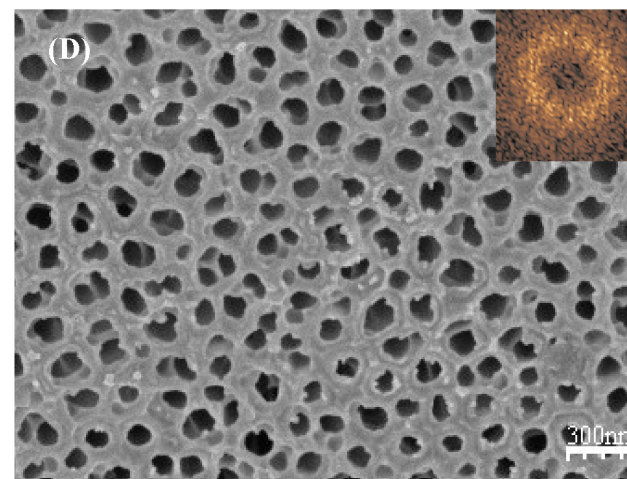
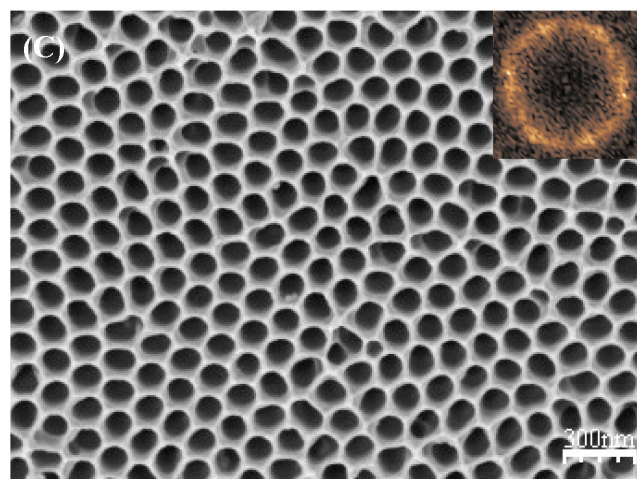
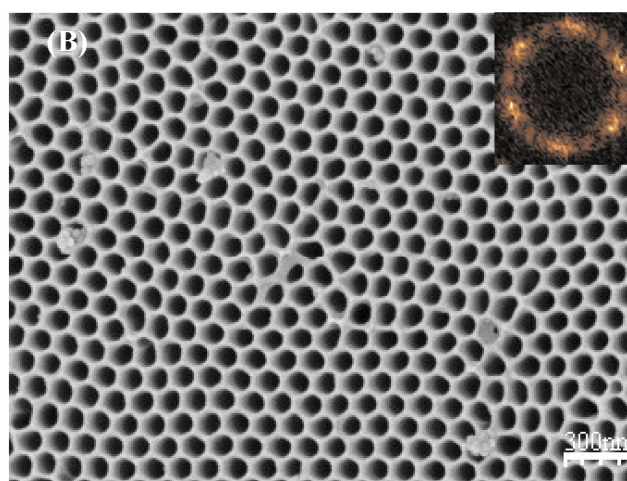
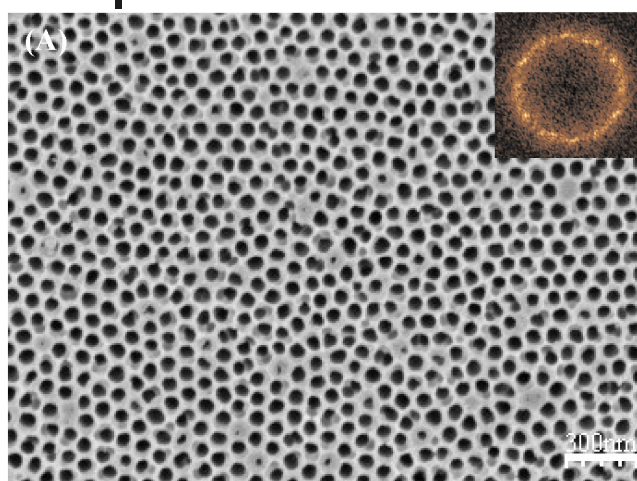
H. Masuda, K. Nishio, N. Baba *Jpn. J. Appl. Phys.* **31** (1992) L1775-L1777

Urządzenia oparte na
AAO



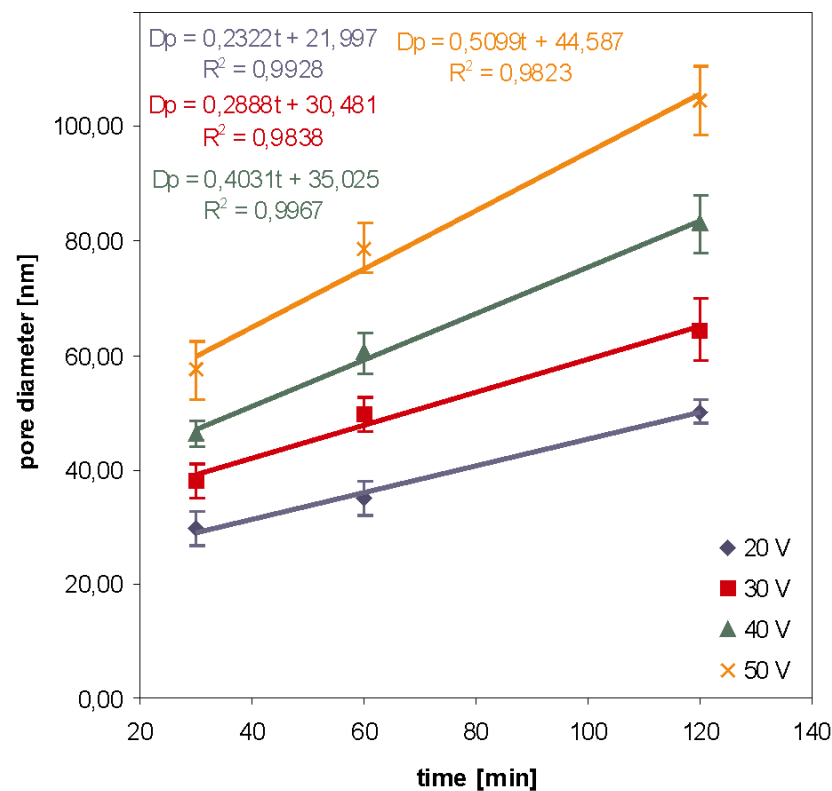
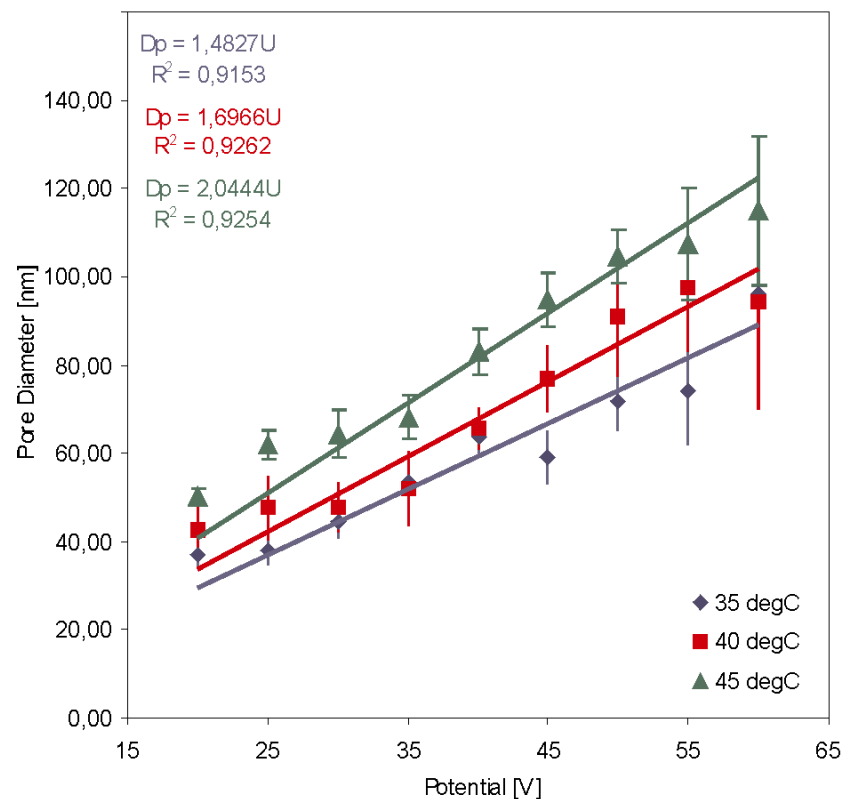
A.V. Kukhta, G.G. Gorokh, E.E. Kolesnik, A.I. Mitkovets, M.I. Taoubi, Yu.A. Koshin, A.M. Mozalev *Surf. Sci.* **507-510** (2002) 593-597

Jak kontrolować geometrię porów?

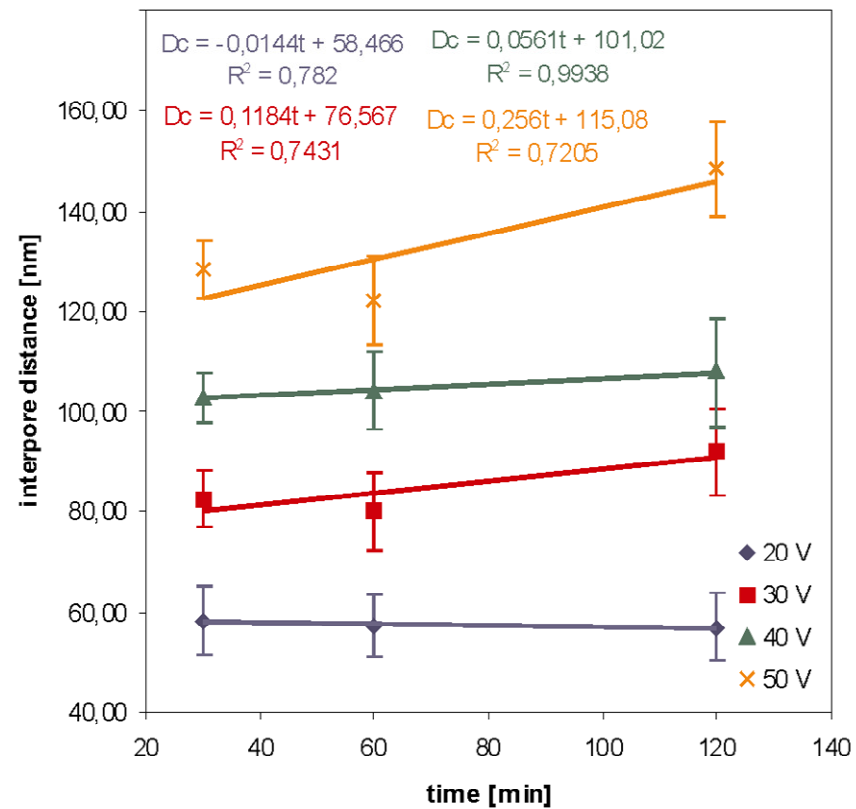
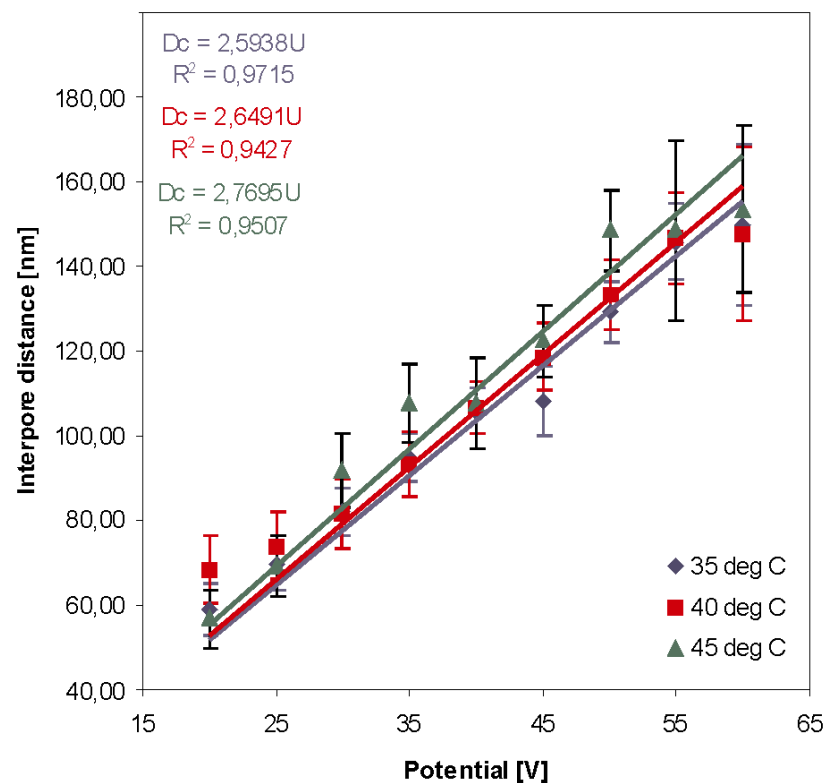


0.3 M $(\text{COOH})_2$
 40 °C, 120
 minutowe etapy,
 potencjały: 30
 (A), 40 (B), 50
 (C) i 60 V (D).

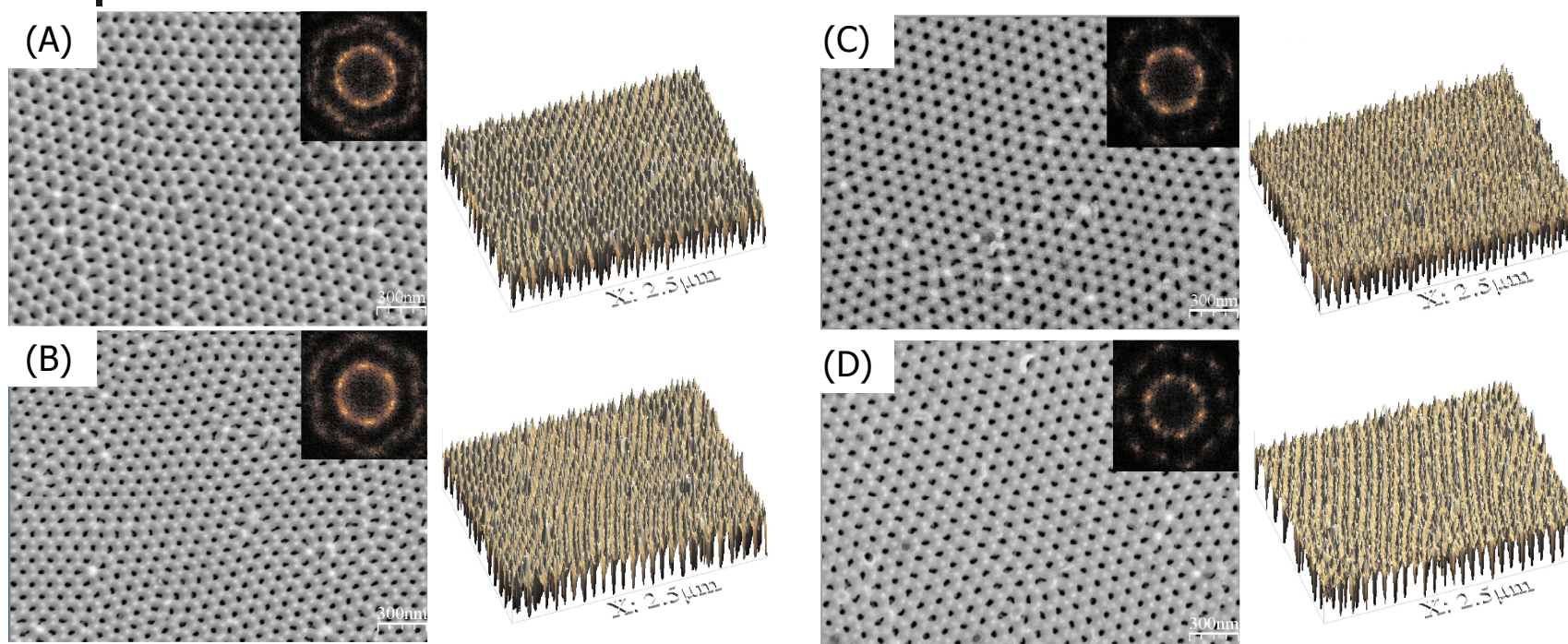
Jak kontrolować geometrię porów?



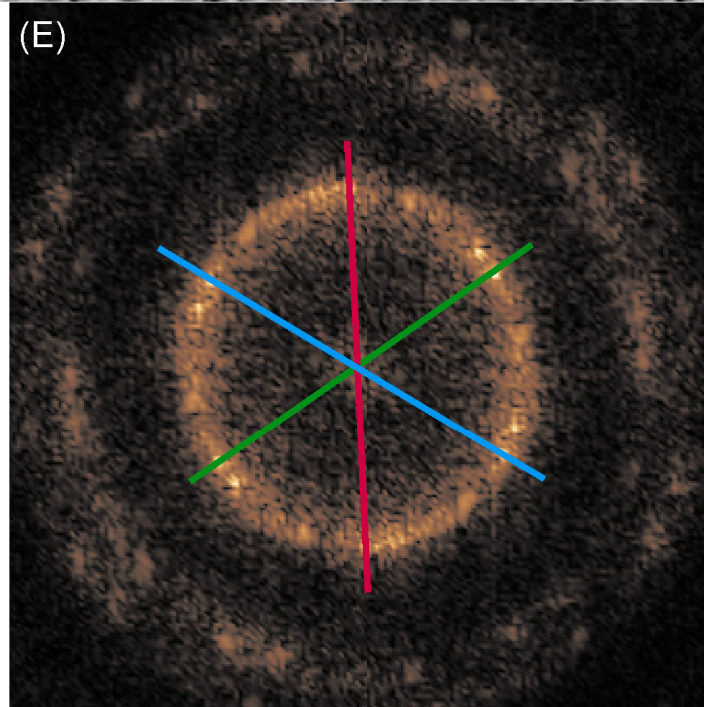
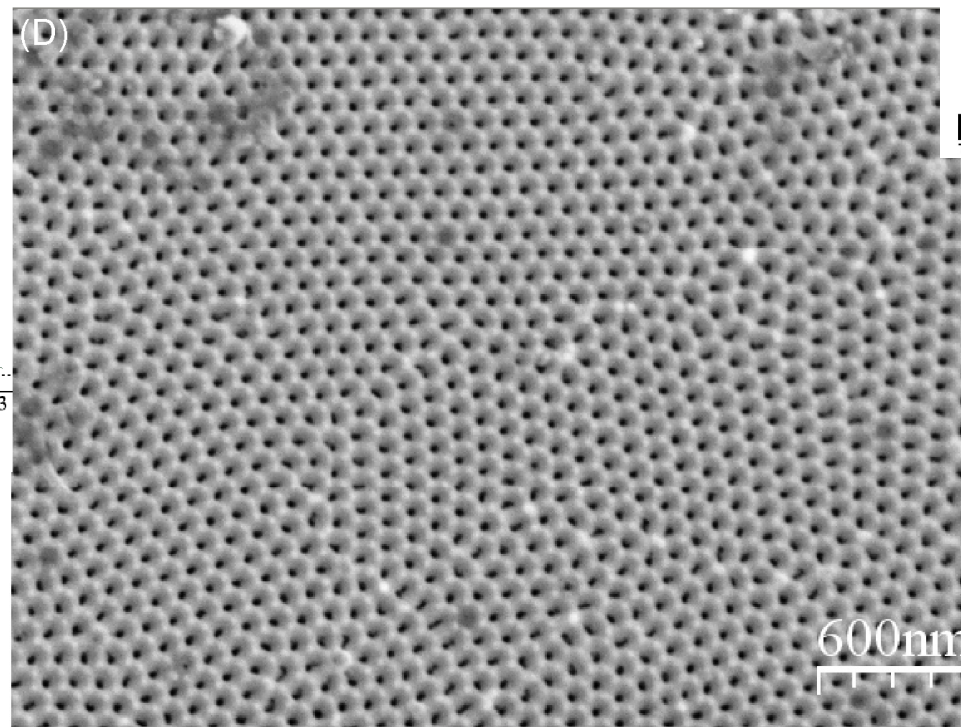
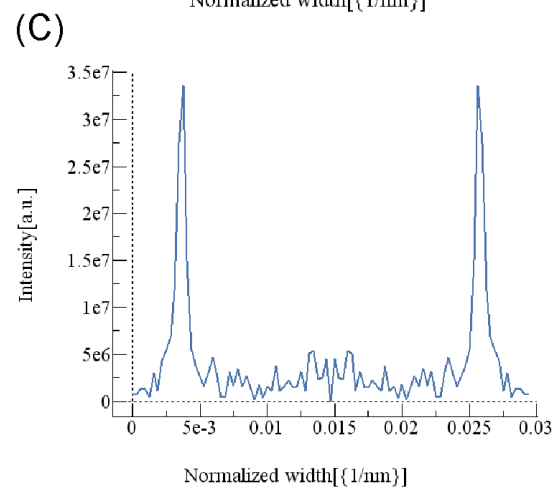
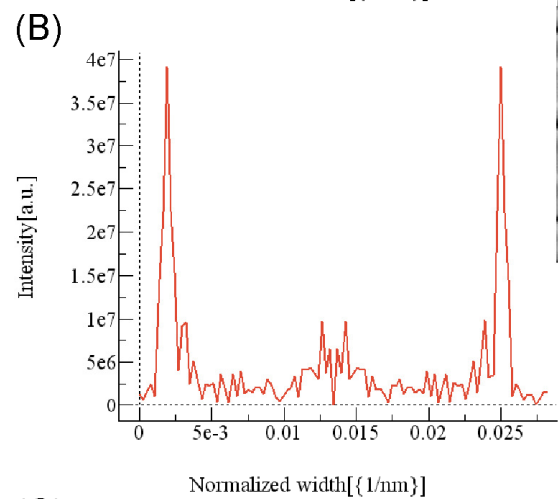
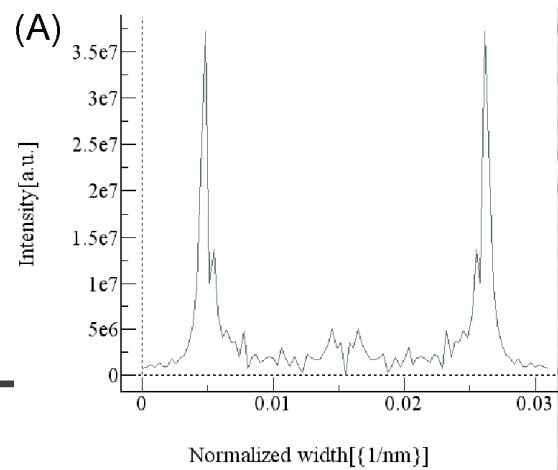
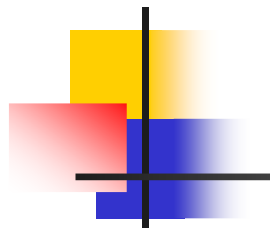
Jak kontrolować geometrię porów?

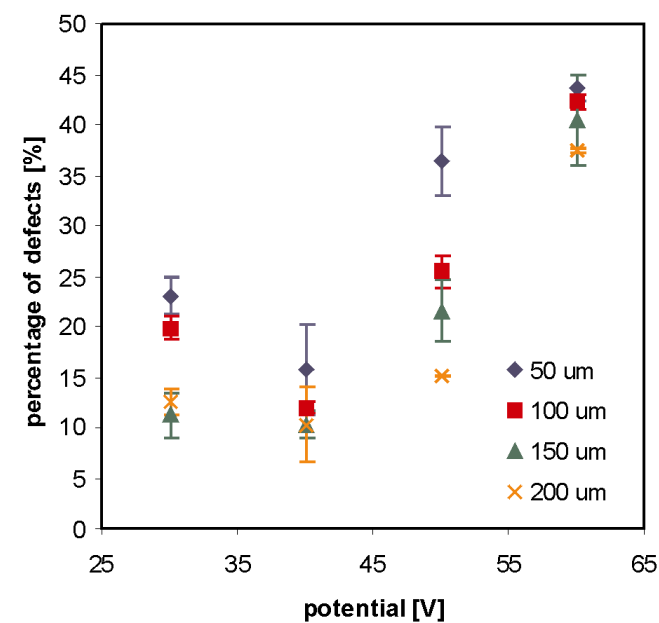
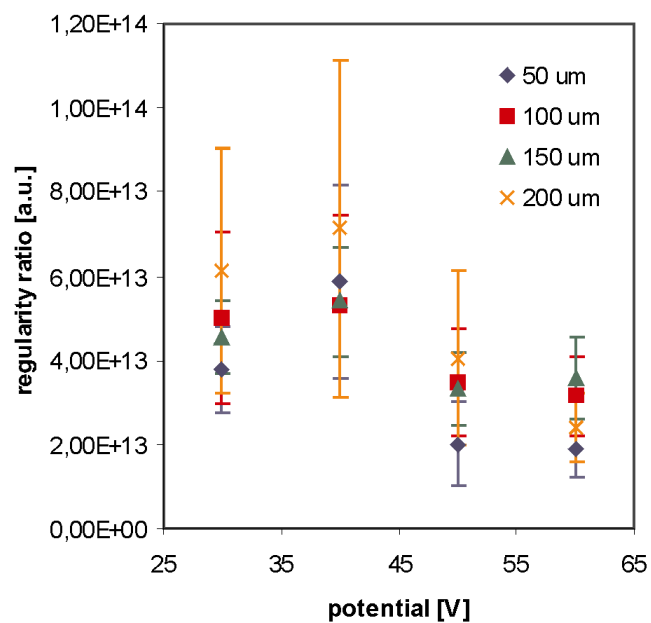
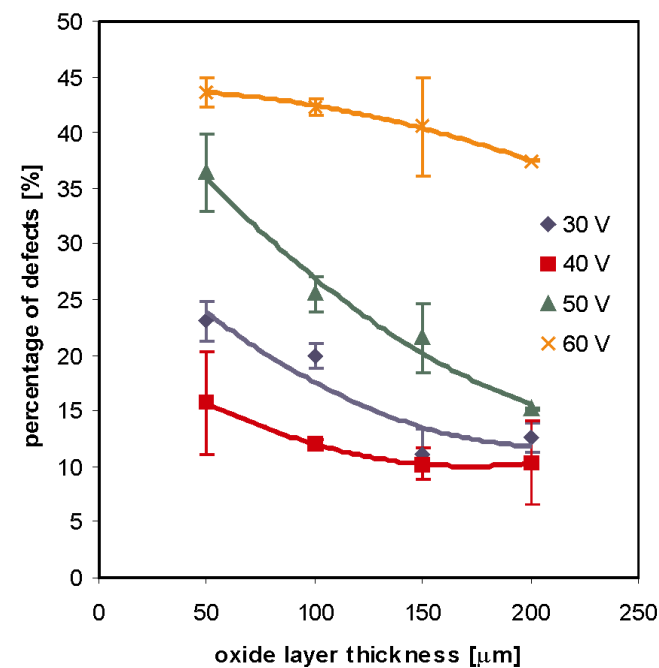
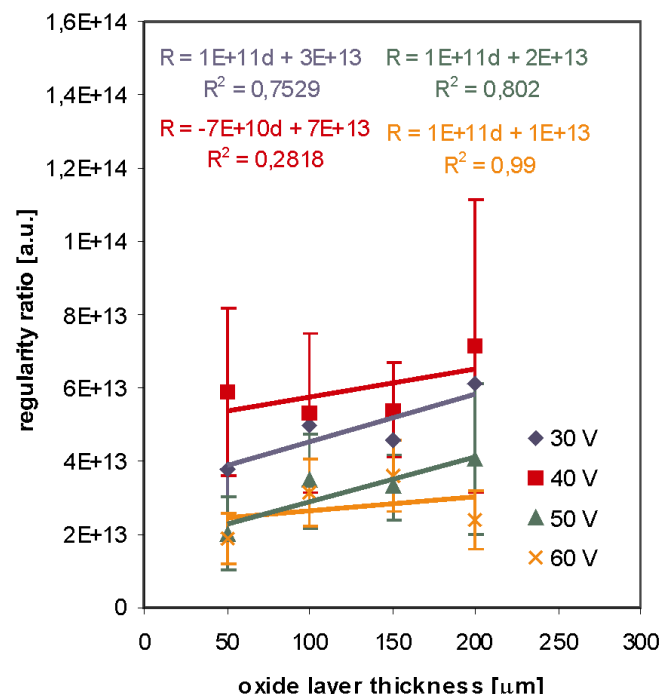
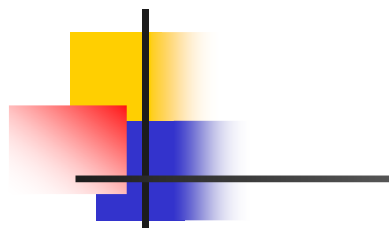


Jak kontrolować uporządkowanie porów?



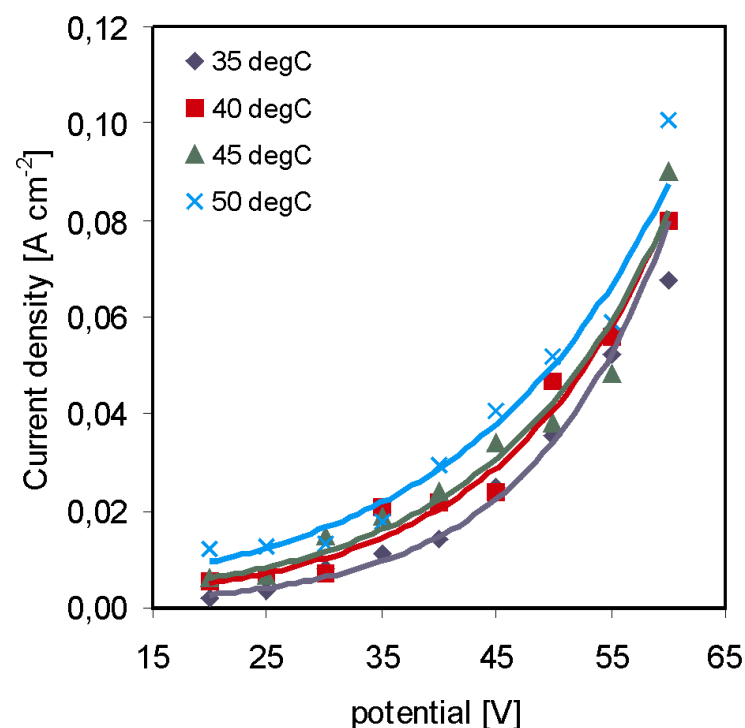
0.3 M $(\text{COOH})_2$, 35 °C, 40 V, 50 (A), 100 (B), 150 (C), 200 (D) μm tlenku po 1^o anodyzacji



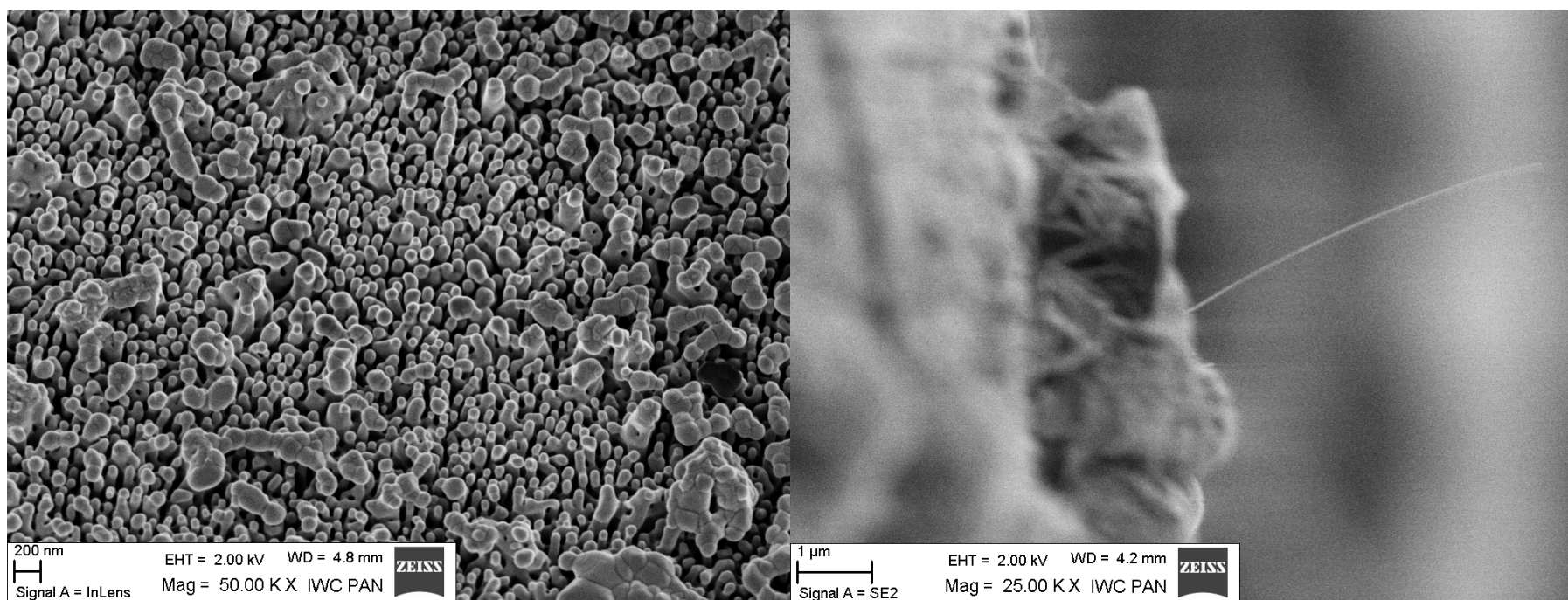


Na czym polega innowacja ???

Wysoka temperatura →
 wysoka gęstość prądu →
 szybki wzrost tlenku =
 oszczędność czasu i brak
 konieczności chłodzenia układu
 + kontrola geometrii porów i
 uporządkowania = **wydajne**
 uzyskiwanie materiału
 będącego
najpopularniejszym
 templatem w
nanotechnologii

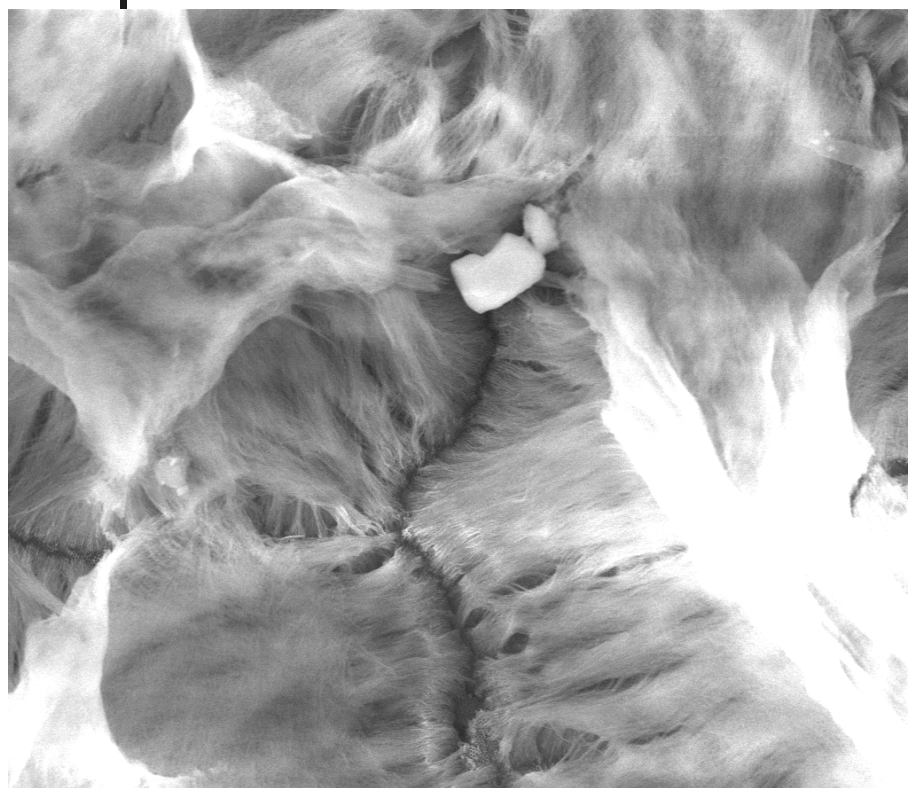


Zastosowania

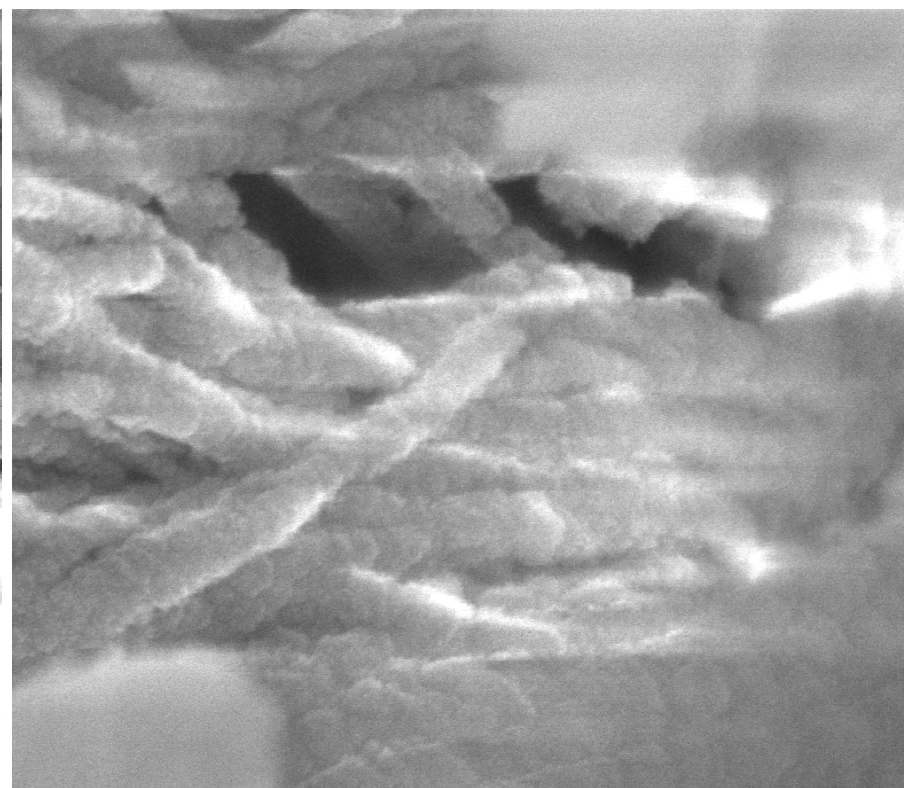


Nanodruty z ZrO_2 - Pr – współpraca z Dr Inż. J.D. Fidelus (IWC PAN)

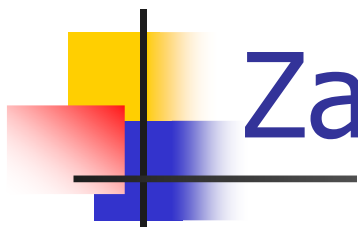
Zastosowania



	mode Custom	WD 13.8 mm	mag 5 000 x	dwel 10 μs	10 μm	Quanta 3D FEG
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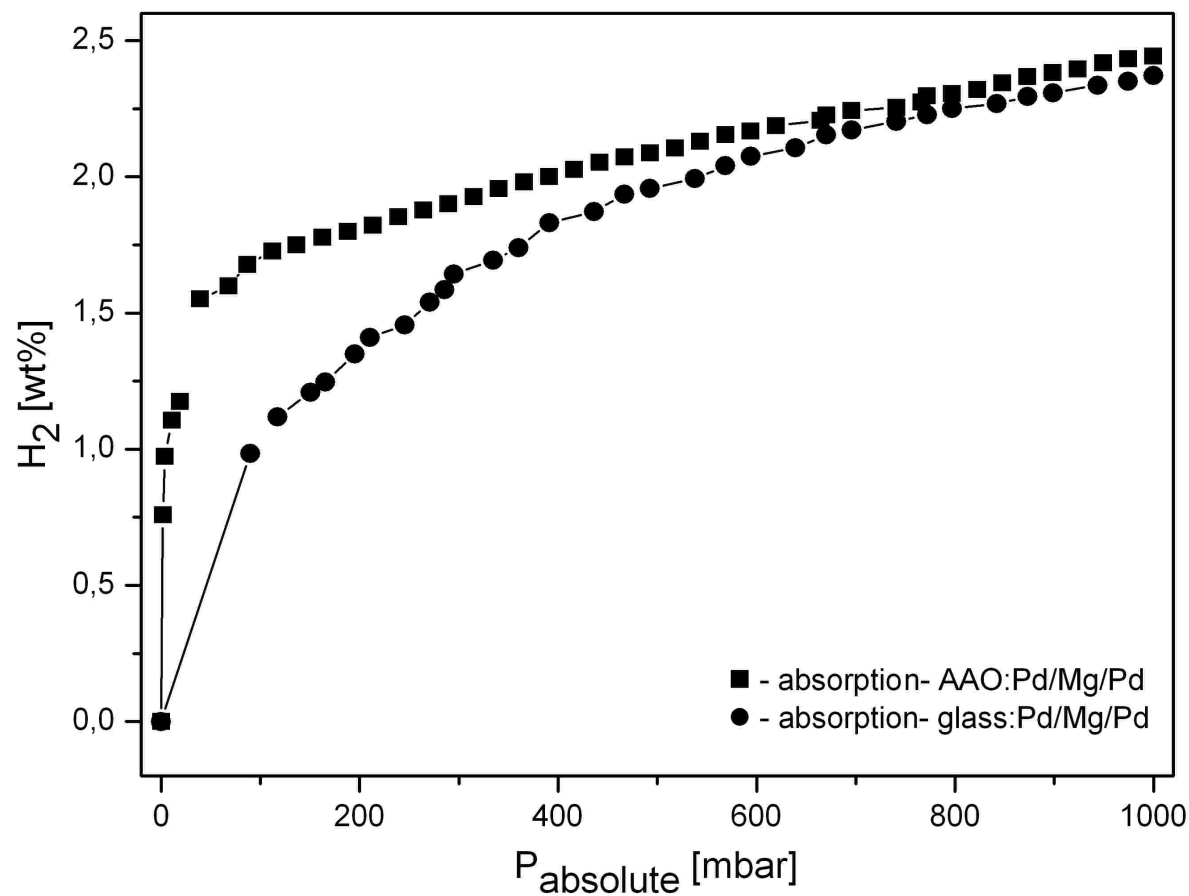


	mode Custom	WD 15.0 mm	mag 200 000 x	dwel 10 μs	300 nm	Quanta 3D FEG
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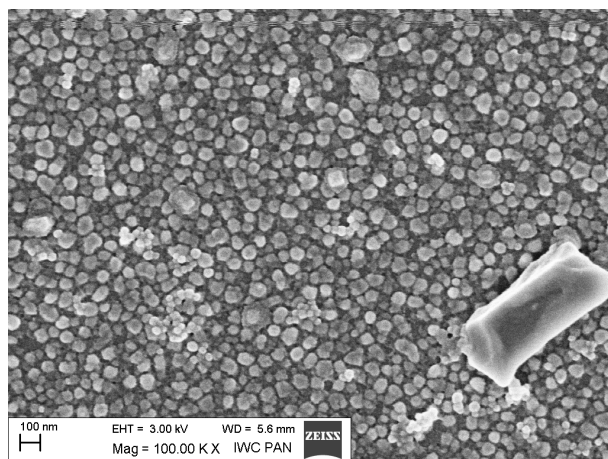
Zastosowania

Wysoka i
sprawna
absorpcja
wodoru

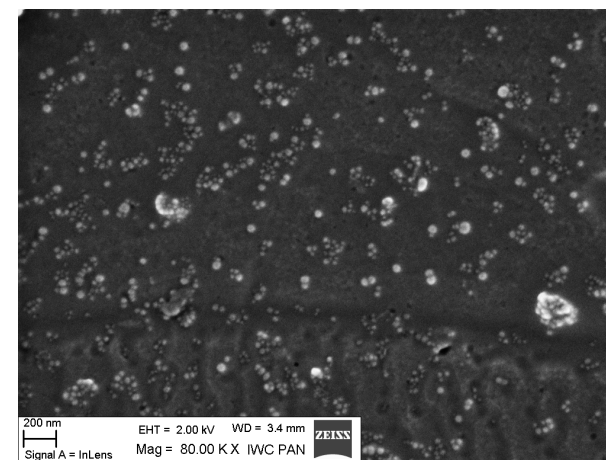
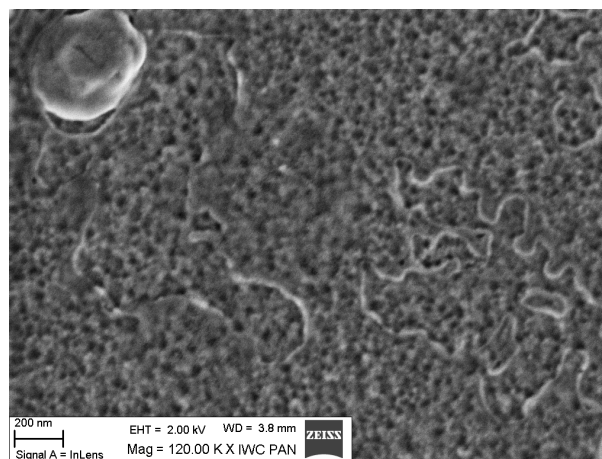


Anodyzacja innych materiałów

5% H_3PO_4

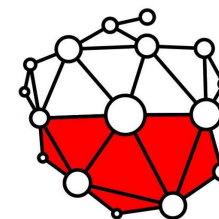


0.3 M kwas cytrynowy





Dziękuję za uwagę



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