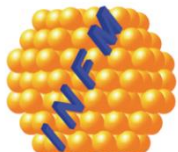


Methane combustion using Pd deposited on CeOx-MnOx/La-Al₂O₃ pellistors

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The as-prepared materials were deposited on Pt microcoils (made of Platinum microwires of 25 μm diameter) by drop method (see Figure 1a). The obtained pellistor is presented in Figure 1b. The samples were named as: D2 ($\text{CeO}_x\text{-MnO}_x/\text{La-Al}_2\text{O}_3$); 1,25%Pd/D2 (1.25%Pd deposited on $\text{CeO}_x\text{-MnO}_x/\text{La-Al}_2\text{O}_3$); 2.50%Pd/D2 (2.50%Pd deposited on $\text{CeO}_x\text{-MnO}_x/\text{La-Al}_2\text{O}_3$) and 5.00%Pd/D2 (5.00%Pd deposited on $\text{CeO}_x\text{-MnO}_x/\text{La-Al}_2\text{O}_3$)

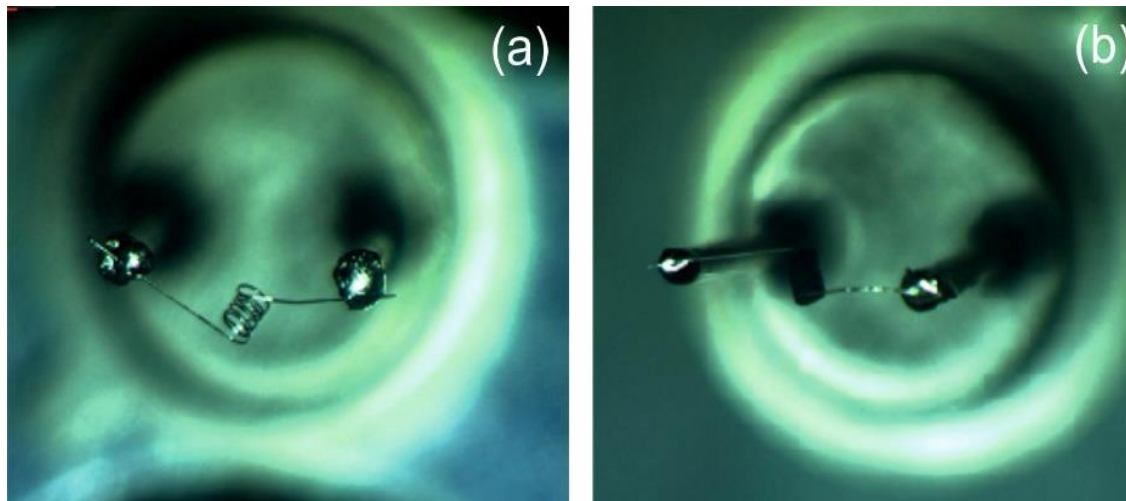
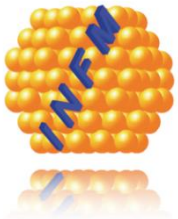
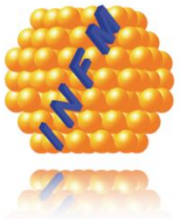
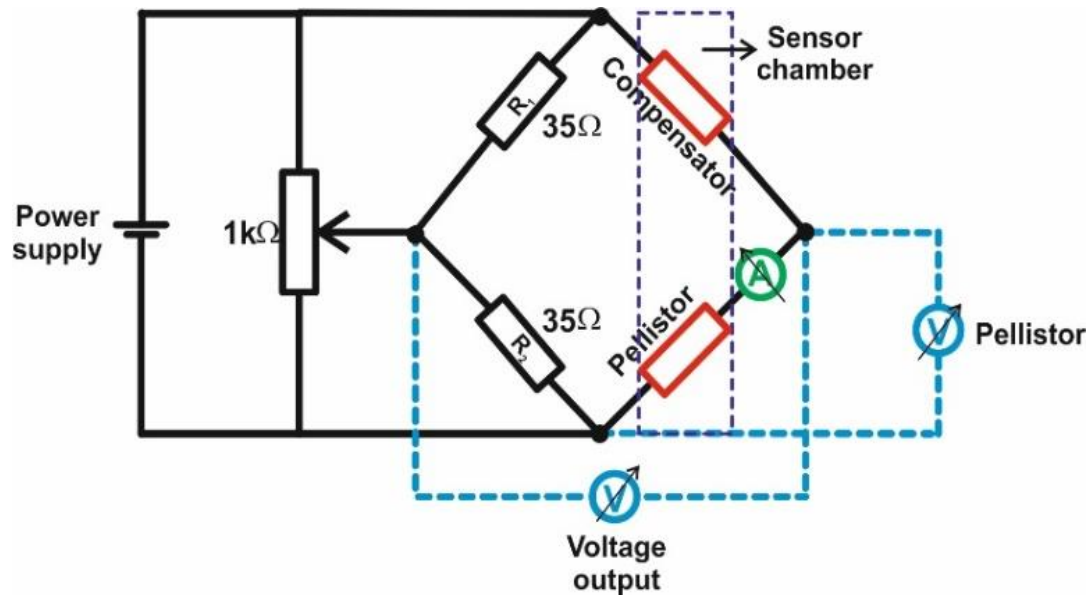


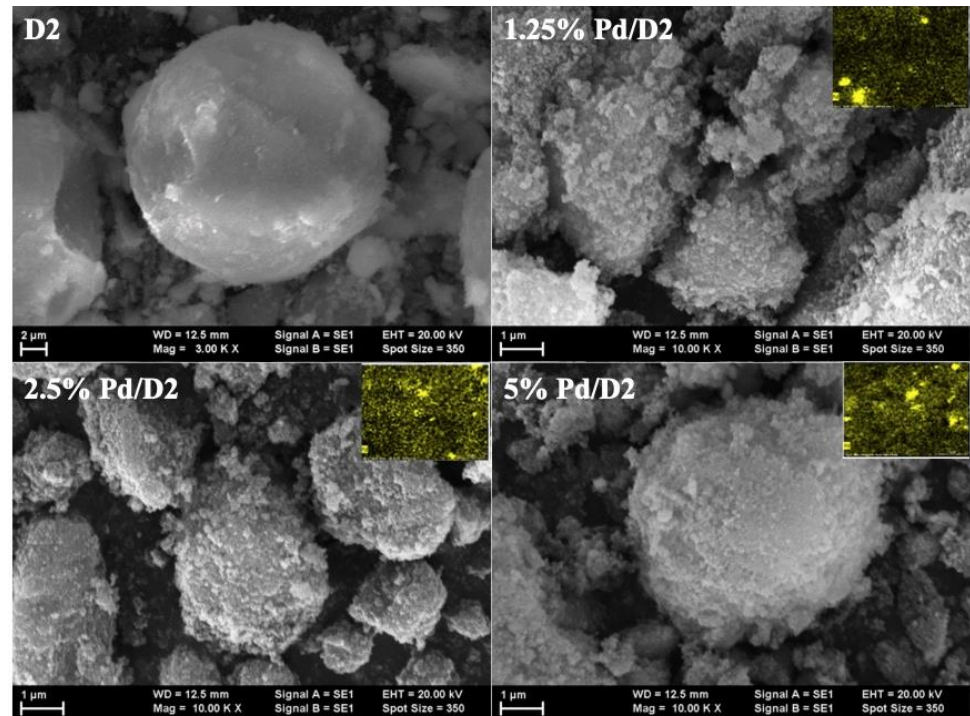
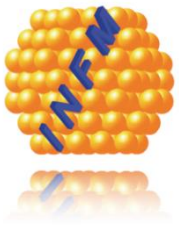
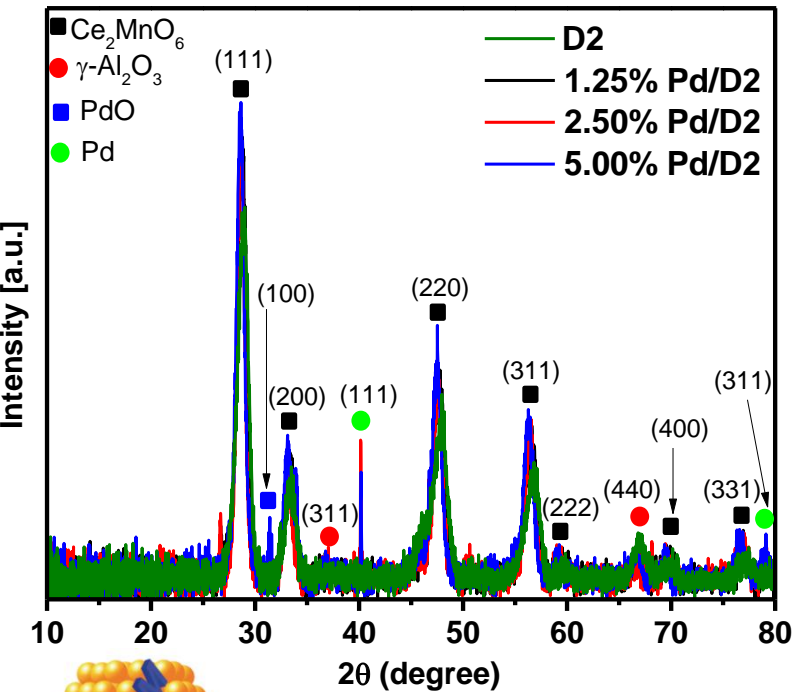
Figure 1. Pt microcoil (a) and the sensitive material deposited on microcoil ready for methane detection (b).



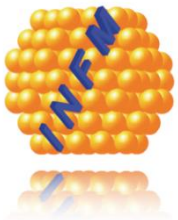
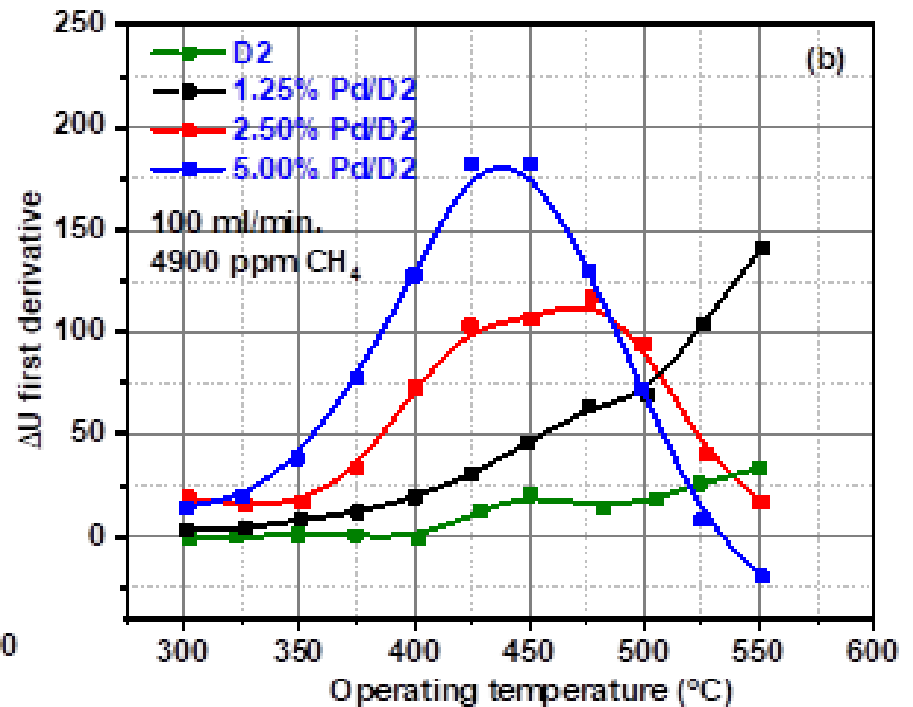
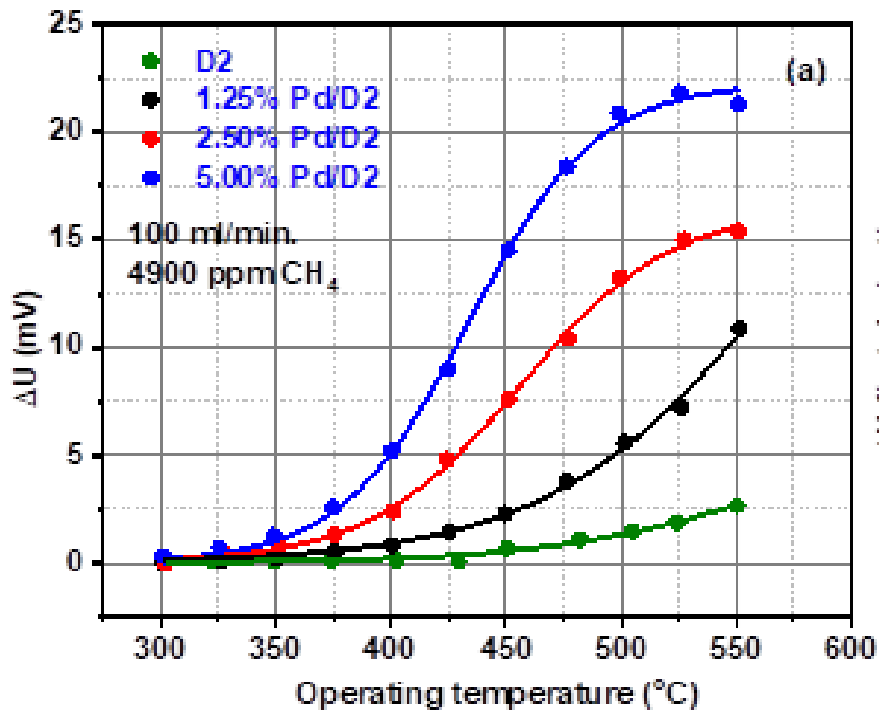
The Wheatstone bridge



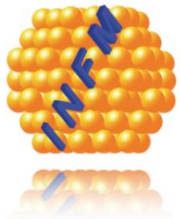
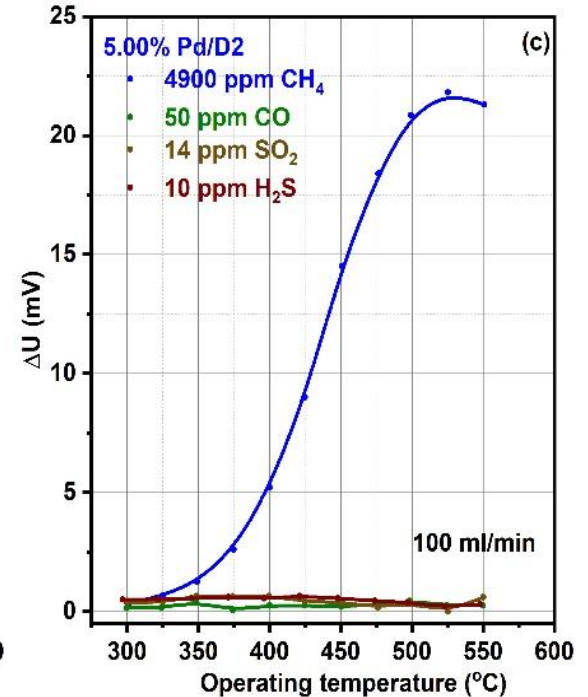
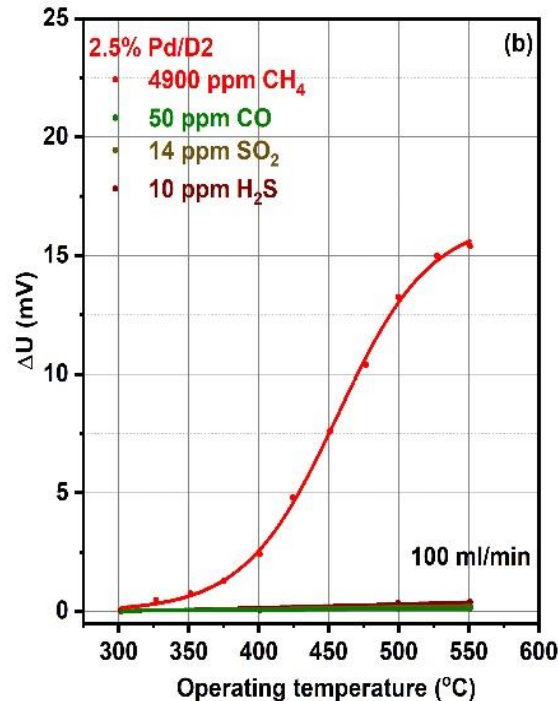
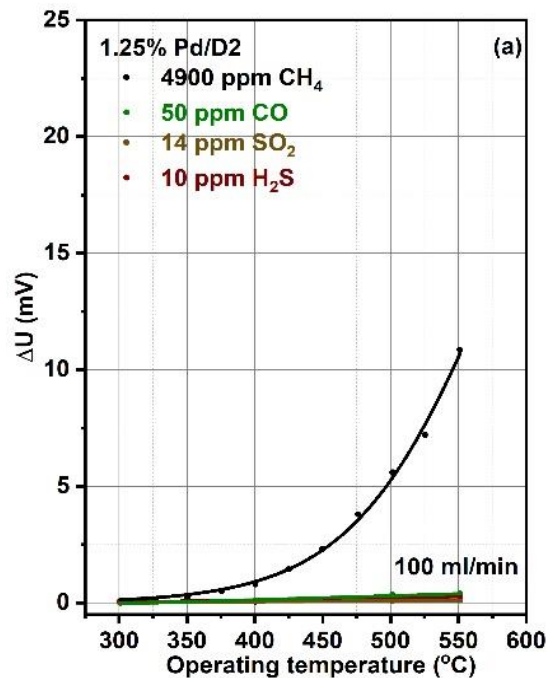
Materials Characterisation



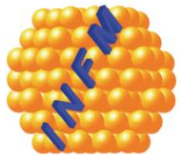
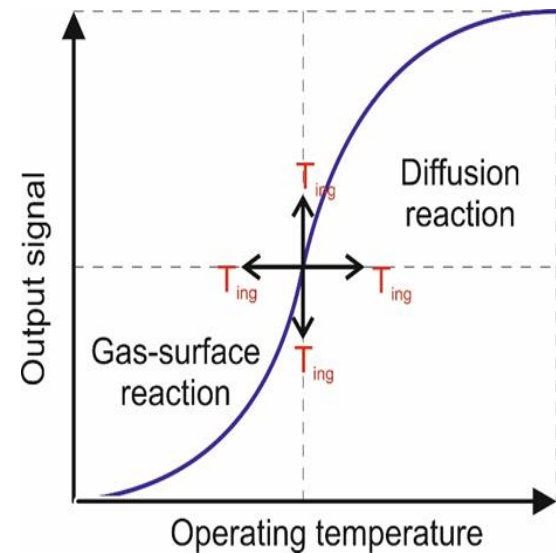
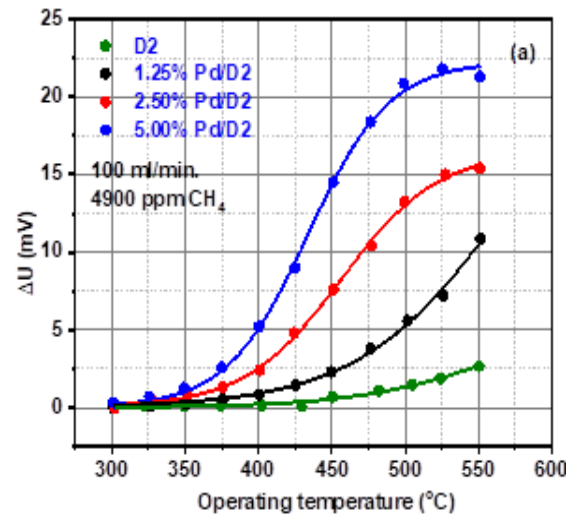
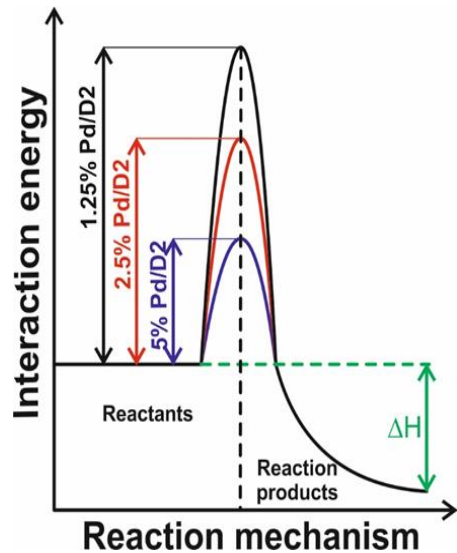
Catalytic Combustion Results



Catalytic Combustion Results – Selective-sensitivity

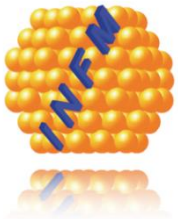


Catalytic Combustion Results – Modeling of the CH₄ combustion



Conclusions

- The built pellistors were subject to CH₄ detection over a wide range of operating temperature regimes. In this respect we could determine **the linearity region of operation**, as well as **the maximum temperature** for the highest value of the signal output from the Wheatstone bridge.
- The highest catalytic conversion of methane was attained using 5% Pd deposited on CeO_x-MnO_x/La-Al₂O₃, most probably to the presence of two types of Pd, cationic and metallic. Using the aforementioned material, we have emphasized two major characteristics, namely the **linearity region** with respect to different concentrations of CH₄ as well as its **higher selective potential** manifested against different target gases such as, CO, SO₂ and H₂S.
- We have presented a schematic approach aiming to explain **the sigmoid behavior** express by the 5% Pd deposited on CeO_x-MnO_x/La-Al₂O₃ pellistor as well as to decouple between the two main possible gas reactions *id est*. surface reaction and bulk diffusion.



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- project 12 PFE/2018.

Thank you for your attention!