

碳材料电化学腐蚀的质谱-电化学循环伏安(MSCV)法的研究: I. 溶液pH值对不同 碳材料的影响

刘佩芳,邓海腾,查全性

武汉大学电化学研究室

收稿日期 修回日期 网络版发布日期 接受日期

摘要 用MSCV法研究了活性炭及乙炔黑在pH1-12范围内的电氧化,两种炭的 $\varphi_{\sim s}$ 、 $\eta_{\sim s}$ 与pH的关系($\varphi_{\sim s}$ 及 $\eta_{\sim s}$ 是CO₂开始析出的电位及超电位)以及I~M、 $\varphi_{\sim I}$ 与pH的关系(I~M、 $\varphi_{\sim I}$ 分别为给定电位下的质谱强度及给定I~M下的电位)均为一折点在的pH~7的折线。这暗示酸、碱介质中有不同的氧化机理。pH>7时, $\eta_{\sim s}$ 及Tafel斜率b均较pH<7时的大。似可推断在酸性介质中形成CO₂所需的氧原子来自水分子放电,其活性明显大于来自碱性溶液中OH⁻放电产生的氧原子。因而在酸性介质中炭氧化为CO₂较碱性介质中易于进行。两种炭之间氧化活性亦有明显区别。活性炭的 $\varphi_{\sim s}$ 比 φ_{iii} (O₂/H₂O)负400-600mV;乙炔黑的 $\varphi_{\sim s}$ 则接近或正于 φ_{iii}

(O₂/H₂O)。前者的I~M及b均后者大。乙炔黑较低的氧化活性可归因于其较高的有序性结构。

关键词 [碳材料](#) [溶液PH值](#) [MSCV](#) [循环伏安法](#) [电化学](#) [质谱法](#) [乙炔黑](#) [活性炭](#) [电位](#) [氧化活性有序性](#)

分类号 [0646](#)

MSCV studies of carbon electrooxidation: I. Influences of pH on different carbon materials

Liu Peifang,Deng Haiteng,Cha Quanxing

Abstract The electrooxidation of active carbon and acetylene black was studied using MSCV (Mass Spectroscopic Cyclic Voltammetry) technique over pH 1-12. For both active carbon and acetylene black the pH dependences of $\varphi_{\sim s}$ and $\eta_{\sim s}$ (the onset potential and overpotential of CO₂ formation), I~M (the mass intensity of CO₂ at a given potential) and $\varphi_{\sim I}$ (the potential at a given mass intensity) are all broken lines deflecting near pH 7. These phenomena imply that the mechanism of carbon oxidation is different in acidic and basic media. Both $\eta_{\sim s}$ and Tafel slope b in the range of pH>7 were found higher than that in pH<7. Based on these observations it is postulated that in acidic media the O atom needed for CO₂ formation comes from the discharge of H₂O molecules and the oxidation of carbon to CO₂ is easier than in basic media where the O atom comes from the discharge of OH⁻. There were also distinct differences between active carbon and acetylene black. $\varphi_{\sim s}$ was found 400-600mV lower than φ_{iii} (O₂/H₂O) for active carbon but close to or higher than φ_{iii} (O₂/H₂O) for acetylene black. At the same time, I~M and b of the former were higher than the latter. The lower oxidation activity of acetylene black is attributed to its more highly ordered structure.

Key words [CYCLOVOLTAMGRAPH](#) [ELECTROCHEMISTRY](#) [MASS SPECTROGRAPHY](#) [ACETYLENE BLACK](#) [ACTIVE CARBON](#) [ELECTRIC POTENTIAL](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(0KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“碳材料”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [刘佩芳](#)
- [邓海腾](#)
- [查全性](#)