

研究论文

非晶氮化铁薄膜的生长机制传统动力学生长标度方法的适用性

徐妮¹, 王欣², 贾辉³, 郑伟涛², 龙北红²

1. 吉林大学化学学院, 无机合成与制备化学国家重点实验室,
2. 吉林大学材料科学与工程学院, 汽车材料教育部重点实验室, 长春 130012;
3. 北华大学物理学院, 吉林 132021

收稿日期 2007-4-26 修回日期 网络版发布日期 2007-11-12 接受日期

摘要 采用动力学标度方法研究了磁控溅射沉积的非晶氮化铁薄膜的动力学生长机制, 结果表明, 具有连续类柱状岛形貌的非晶氮化铁薄膜具有标度不变的自仿射分形特点, 其粗糙度指数 $\alpha=0.82\pm 0.21$, 生长指数 $\beta=0.44\pm 0.07$, 动力学标度指数 $1/z=0.54\pm 0.07$. 薄膜生长符合提出的热重新发射生长模型.

关键词 [非晶氮化铁薄膜](#) [动力学标度方法](#) [热重新发射模型](#)

分类号 [O643.1](#) [O614](#) [O484.5](#)

DOI:

Growth Behavior of Amorphous Fe—N Thin Films Applicability of Conventional Dynamic Scaling Approach

XU Wei¹, WANG Xin^{2*}, JIA Hui³, ZHENG Wei-Tao², LONG Bei-Hong²

1. State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry,
2. Key laboratory of Automobile Materials of MOE, Collgeg of Materials Science and Engineering, Jilin University, Changchun 130012, China;
3. School of Physics, Beihua University, Jilin 132021, China

Received 2007-4-26 Revised Online 2007-11-12 Accepted

Abstract Dynamic scaling approach is an effective tool for studying the growth behavior of roughness surfaces. The growth behavior of amorphous Fe—N thin films grown by dc magnetron sputtering at 250 °C substrate temperature was investigated. The surface morphology of the films appeared as a set of continuous mounds and exhibited scale-invariant self-affine fractal. The measured dynamic scaling components($\alpha=0.82\pm 0.21$, $\beta=0.44\pm 0.07$, and $1/z=0.54\pm 0.07$) are consistent with the conventional dynamic scaling relationship $z=\alpha/\beta$. The intermediate value of growth exponent β agrees well with the thermal reemission model suggested by Karabacak *et al.* It might be concluded that both reemission of atoms and surface diffusion are the surface smoothing effects for the shadowing growth of amorphous Fe—N films at high substrate temperatures.

Key words [Amorphous iron nitride thin films](#); [Dynamic scaling approach](#); [Thermal reemissions model](#)

通讯作者:

王欣 wang_xin@jlu.edu.cn

作者个人主页: 徐妮¹; 王欣²; 贾辉³; 郑伟涛²; 龙北红²

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF \(2544KB\)](#)

▶ [\[HTML全文\] \(0KB\)](#)

▶ [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](#)

▶ [引用本文](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“非晶氮化铁薄膜”的
相关文章](#)

▶ [本文作者相关文章](#)

· [徐妮](#)

· [王欣](#)

· [贾辉](#)

· [郑伟涛](#)

· [龙北红](#)