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This Week's Citation Classic®

Bauer E & Poppa H. Recent advances in epitaxy. *Thin Solid Films* 12:167-85, 1972.
[Physikalisches Institut, Technische Universität Clausthal, Federal Republic of Germany and NASA Ames Research Center, Moffett Field, CA]

The various growth modes occurring in epitaxy are illustrated by comparing the growth of Au and Ag on a variety of substrates ranging from ionic to homopolar to metallic crystals. Recent studies with modern surface-science techniques confirm and refine existing growth models. [The *SCI*® indicates that this paper has been cited in over 235 publications.]

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First, I must confess that it took a second request by ISI® and the reading of an article by E. Garfield[1] to convince me to indulge in some reminiscences. Secondly, like many other authors, I feel that this paper does not belong with my most important scientific contributions. If I would have to identify my most important work in the field covered by the paper, I would mention without hesitation reference 2. Unfortunately, reference 2 was not published in an international journal and is in German. Therefore, it was condemned to such obscurity that its content could be rediscovered again 20 years later in a somewhat different context, physisorption, in which it was called wetting.[3,4]

An invitation to review the present state of epitaxy for an international conference in a pleasant place (Venice), at a pleasant time (May), was therefore a welcome opportunity to bring these old ideas to the attention of the scientific community. Unfortunately, I had moved just two and one-half years before the conference from Michelson Laboratory (China Lake, California) to the Technical University Clausthal, where I had been busy building up surface physics and fighting against students and faculty in order to maintain acceptable educational standards during the height of the student unrest period. Therefore, I had very few results of my own systematic experimental work to offer. This led to the idea to make a concoction of diverse results obtained during my brief research stays at the NASA Ames Research Center during the summers of 1970 and 1971. There I recovered from the Clausthal stress by spending all day doing epitaxy experiments without distractions, together with H. Poppa in his well-equipped and quiet laboratory.

Because of its improvised nature, I was not very happy with this paper at the time of its writing, but it apparently appeared at the right time. Molecular beam epitaxy was still in its infancy, but interest in it was growing rapidly in the mid-1970s, and many people became aware for the first time of the various modes in which thin films can grow. I really don't know how much effect this work had on the field beyond creating this awareness.[5] In metal epitaxy[6] it certainly played an important role, and it may become important in connection with metallic superlattices.[7] A brief look at the semiconductor molecular beam epitaxy literature, however, indicates no impact whatsoever. The paper has also not resulted in awards or honors but presumably played a role in my professional advancement.

In retrospect I am pleased and surprised that the paper became a *Citation Classic* because I see this as a belated recognition of my old work[2] and of the work of my collaborators at the Michelson Laboratory and at the NASA laboratory, which was incorporated in the paper.

1. **Garfield E.** *Citation Classics*—four years of the human side of science. *Essays of an information scientist.* Philadelphia: ISI Press, 1983. Vol. 5. p. 123-34.
2. **Bauer E.** Phaenomenologische Theorie der Kristallabscheidung an Oberflaechen (Phenomenological theories of crystal deposits on surfaces). *Z. Kristallogr.* 110:372-431, 1958. (Cited 95 times.)
3. **Dash J G.** Clustering and percolation transitions in helium and other thin films. *Phys. Rev. B—Solid State* 15:3136-46, 1977. (Cited 80 times.)
4. **Peierls R.** Clustering in adsorbed films. *Phys. Rev. B—Condensed Matter* 18:2013-5, 1978. (Cited 25 times.)
5. **van der Merwe J H.** Recent developments in the theory of epitaxy. (Vanselow R & Howe R. eds.) *Chemistry and physics of solid surfaces.* Berlin: Springer, 1984. Vol. 5. p. 365-401.
6. **Bauer E.** Metals on metals. (King D A & Woodruff D P. eds.) *The chemical physics of solid surfaces and heterogeneous catalysis.* Amsterdam: Elsevier, 1984. Vol. 3B. p. 1-57.
7. **Bauer E & van der Merwe J H.** Structure and growth of crystalline superlattices: from monolayer to superlattice. *Phys. Rev. B—Condensed Matter* 33:3657-71, 1986.