1. Title
Smallest Nanoelectronics with Adatom Chains

2. Author
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3. Conference
A conference talk will be given at NanoSpace-98 of NASA Johnson Space Center, November 1-6, 1998. I do not submit a proceedings paper although authors were invited to do so. Therefore, none of the slides will be published.

5. About VI author/originator verification in form 1676
(1) There is no export controlled, confidential commercial information.
(2) Regarding the patent, the technical field covered here is related to ARC-14246, "Doping Method of Semiconducting Atomic Chains." This is a talk only, without a proceedings paper (abstract was submitted last spring, and form 1676 was filed and approved at that time), and ARC-14246 covers the content. The talk is focused on the general aspect of atomic chain electronics that I have been studying for last three years. Results have been published before, but are being rederived here using a new physical/mathematical picture/model, which deepens the physical understanding. The content is protected from a patent point of view.

6. Slides
See the attached copy.
RTOP # 519-40-12 Description

RTOP # 519-40-12 authorizes Code IN work by the Application Analysis and Tools (AAT) Group in partial fulfillment of Information Technology (IT) program objectives documented in the IT Program Statement, cf. Sec. 2.1.1.1. Technology dissemination is authorized under guidelines set forth in Sec. 5.0 “Technology Transfer/Sensitive Data Control”. The IT program is currently administered by acting program manager Eugene Tu (ext. 4-4486).

The document entitled “Smallest Nanoelectronics with Adatom Chains”, written by Toshishige Yamada, conforms to Sec. 5.0 guidelines, and contains no material under direct or indirect control of the U.S. Commerce Department.
Almost disconnected atomic wires

Muller, van Rheenen, & de Jonge. PRL 69, 140 (92).

4. Conduccione quantization

3. Lateral coherent coupling


Becker, C, Sivachuk, E, Hamann. SI(111)7×7.


SI(111)3×1 dangling bond chain: SI(111)2×1 dangling bond chain.


2. Vertical I-V spectroscopy with STM

H on Si: Sivachuk, E, Wang, G. Crepeau, PRB 57, 2579 (93).


Chomel, Lourie & Fishell, Science 262, 218 (93).

Re on Cu: Sivachuk, E, Wang, G. Crepeau, PRB 57, 2579 (93).

3. Lateral coherent coupling

Model: FC. CA 503-1000


Toshishibe Yamada

with Atomic Chain

smallest nanoelectronics

Rapid progress in STM experiment
Towards devices with gain
Transport through junctions
Ohmic contact
Substrate effects

Donors, Group I, acceptors, Group VII
Periodic, beside the chain
Doping method:
MgS chain: semiconducting

So far:

As a template - no uncertainty
Precede adatom structures on a regulated surface

Summary:

Conditions for Shockley surface mode

Al contact:

Extended, large C
Frequent exchange (Ohmic contact)

Localized, small C
Frequent exchange

Al exchange, contact