29th Annual Meeting of the Society of Architectural Historians, Philadelphia, U. S. A., May 19–24, 1976

American Style of Architecture in Hokkaido, Japan

Takeshi KOSHINO

In the late nineteenth century Western-style architecture in Japan, certain American influences have been pointed out by previous workers. The said influence is prominent in the early buildings in Hokkaido, chiefly constructed by the Colonial Department (1869–1882).

In these earlier buildings, the Colonial Headquarters (1873) and others, of which the styles derived from American architecture, not only copying but experimental efforts were made to assimilate the alien.

To the Model and Corn Barns (1877) and the Military Hall (1878) of the Sapporo Agricultural College, the balloon-frame construction was adopted from contemporary American building art. It is noted that the plainness of exterior design of them influenced the buildings thereafter such as the Hoheikan (1880).

American architecture had a fovorable influence on Japanese architecture at that time, because they both share the tradition of well developed timber architecture and also the virtue of plain design.

6th International Congress on Metallic Corrosion, Dec. 3–9, 1975. Sydney, Australia

Effect of Heat Transfer on Pitting Corrosion of Stainless Steels

Tatsuo ISHIKAWA

In order to elucidate the heat transfer effect on the pitting corrosion of stainless steels, corrosion tests in ferric chloride solutions were carried out under various heat transfer conditions maintaining a constant surface temperature of the test specimen. The total number of pits formed on the surface and maximum depth penetrated to the specimen were examined under microscope.

Some correlations between the magnitude of heat flux and the number of pits, and the maximum penetration depth of pits could be deduced using a least squares method in consideration of the direction of heat transfer through the specimen perpendicular to the corroding surface.

From these experimental results, it was concluded that the pitting corrosion of stainless steels at the same surface temperature was stimulated in the presence of

positive heat transfer from metal to corrosive solution and was suppressed by negative heat transfer In comparison with that under isothermal conditions.

Proceedings of 1975 International Conference on Noise Control Engineering, Sendai, August 27–29, 1975

Separation of Noises of Diesel Engine

Tadashi MURAYAMA and Naoya KOJIMA

For the study of the engine noise, it is necessary to devide it into the noise caused by combustion and the noise from other sources which we call as mechanical noise.

In this report it is tried to separate the combustion noise from others by using the relation which lie between the spectrum of the cylinder pressure and that of the sound.

If the noise caused by the mechanical noise of an engine is not affected by the change of the cylinder pressure and keeps a constant level at its constant operational speed, then we can assume the following relation.

(Engine Noise) = (Cylinder Pressure) × (Transfer Coefficient) + (Mechanical Noise)

The engine noise and the cylinder pressure are analized in Fourier series and correlated with each other, and the transfer function has been determined which is a function only of the frequency and does not depend on the operational conditions. Thus by using this transfer function and the cylinder pressure data, we can now estimate the combustion noise.

This method of separating the combustion noise from the mechanical noise enables us to evaluate qualitatively by the contribution of various noises to the total engine noise when the operational parameters are changed.

Proceedings of the 16th International Machine tool Design and Research Conference, Manchester, England, Sept., 1975

Optimum Sequence of Operations in a Multistage Manufacturing System

Tateshi KISHINAMI and Katsumasa SAITO*

In this paper the problem of optimum sequence of operations in a multi-stage manufacturing system (for example, some machining centers or NC machine tools combined with some operations) is studied in an attempt to a achieve minimum total

* Department of Precision Engineering, Faculty of Engineering, Hokkaido University, Japan

cutting cost. In order to achieve this a dynamic programming was made for a numerical model, which was obtained by relating the optimum sequence of operations to the optimum job allocation for each operation. It was found that dynomic programming is a powerful tool in such cases, for determining the optimum sequence of operations in a multi-stage manufacturing system.

5th international conference on "Conduction and breakdown in dielectric liquids" 28-31 July 1975 Noordwijkerhout, the Netherlands

Effect of Added Electronegative Substances (SF_6, I_2) on Ion Mobility in Mineral Oil

Saburo SAKAMOTO and Shoji USUDA
Department of Electrical Engineering, Faculty of Engineering

Relation between ion mobility and fluid motion in dielectric liquids has been researched by the charge injection method in which razor-blade electrode is used as the emitter. It is observed that the ion drift velocity v_i increases as the drift field Ed increases with the relation $v_i = v_0 + \mu Ed$ (v_0; initial ion velocity at the entrance of drift field, μ; ion mobility).

This paper is concerned with the effect of added SF_6 and iodine I_2 on μ, v_0 and liquid velocity v_l in mineral oil. v_l is measured by a laser-Doppler method.

The following factors are proposed as conclusion.

1) When the negative injection voltage is applied, the value of v_0 in the transformer oil in which SF_6 is absorbed is smaller than in the non-treated one.

2) It is observed v_0 in degased oil is larger than in non-treated one.

3) When iodine I_2 is dissolved, v_0 decreases and reaches a minimum with concentration of $5 \sim 10\,mg/\ell$ in transformer oil. This is corresponding to the dielectric strength of the oil reaches the maximum value at this concentration.

4) The value of μ is regarded as being constant in spite of the above treatments and etc.

International fluidization conference June 15-20, 1975, Asilomer Conference Grounds, Pacific Grove, California, U.S.A. ["Fluidization Technology", 2, 41 (1976)]

A Modification of Fludizing Beds by Inserting Partition Walls and a Modified Distributor

Masahisa FUJIKAWA, Masao KUGO and Kohnosuke SAIGA

It is well known that the contact between gas and solids in industrial fluidized beds is not quite adequate due to the presence and formation of bubbles throughout the bed. In order to eliminate this deficiency, we attempted using a method consisting of inserting partition walls into the bed. Another attempt was made to use a low-pressure-drop gas distributor in multistage fluidized beds.

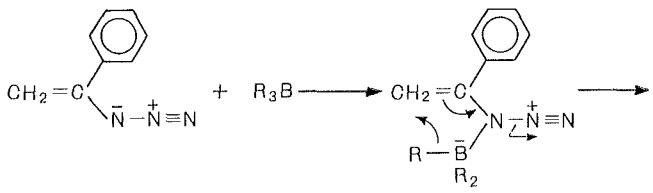
The 7th International Conference on Organometallic Chemistry, Venice, Italy, Sept. 1-5, 1975

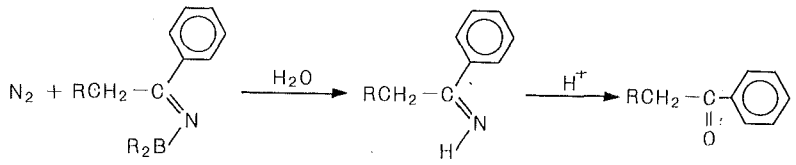
A Facile Reaction of Trialkylboranes with α-Azidostyrene. A Convenient and General Synthesis of Alkyl Aryl Ketones *via* Hydroboration

Akira SUZUKI, Masayoshi TABATA and Michiyasu UEDA

In recent years, many reports have been published dealing with the new syntheses of dialkyl ketones and alkyl alkenyl ketones from organoboranes. However, there are no reports on convenient synthetic procedures for alkyl aryl ketones *via* the reaction of such organoboranes.

We reported at the Conference on a convenient and general synthesis of alkyl aryl ketones by the reaction of trialkylboranes with α-azidostyrene under mild reaction conditions in good yields. It was proposed that the reaction proceeds *via* initial coordination between the azide and trialkylborane, followed by transfer of an alkyl group from boron to carbon, as shown in the following sheme.





The 7th Congress of the International Measurement confederation, London, United Kingdom, May 10/14, 1976

A New Method of Vehicle-Speed Measurement Using Gross-Correlation

T. IDOGAWA and T. ONO*

Speeds of motor vehicles are determined accurately from cross-correlation functions of random waveforms obtained from paved road surfaces. A real-time polarity correlator is described, which gives a speed reading every 400 (μs). Experimental results show that: (1) The correlation length d of the random waveform depends practically only on the diameter of the detector-aperture used. (2) Correlation functions are moderately accurate, if the averaging length L is determined by $L=1000\,d$. (3) Statistical error of speed obtained is proportional to the square root of d/L, when S/N of the random waveform is constant; speeds of a motor vehicle are determined to an accuracy of 1%, when $L=150\,d$ and S/N=1.

First JIM International Symposium (JIMIS-I) "New Aspects of Martensitic Transformation" Kobe, Japan, May 10-12, 1976

Reversible Shape Memory Characterized by Heat-treatment

Kazuyoshi TAKEZAWA and Shin'ichi SATO

The reversible shape memory effect (RSM) is found to be characterized by heat-treatment instead of severe deformation in a Cu-Zn-All alloy. After heating at a moderately high temperature, a circularly bent ribbon of the "pseudoelastic" alloy incompletely recovered its original form upon releasing the constraining force. It shrank and expanded when cooled and heated across Ms, and the shape change was quite reversible after several tens of cycles between the temperatures. The mechanism of appearance of RSM was studied by optical and electron microscopy. The results are summarized as follows:

* Ono Sokki Co., Ltd., 1-27-4 Yaguchi, Ohta-ku, Tokyo, Japan.

1. The heat-treatment produces a deformation of the retained martensites at the expense of the reverted ones.

2. The shape change predominates where the thermal martensites of the same variants as the retained one are formed on cooling.

3. The bainite transformation disturbs the RSM. The RSM may be caused by a localized high stress at the tip of the retained martensite where a large difference in the internal stress is believed to be produced between the revertedand deformed martensites.

6th International Congress on Metallic Corrosion, December 3-9, 1975, Wentworth Hotel, Australia

The Passive Film on Iron in a Neutral Solutions

Norio SATO, Kiyokatsu KUDO and Rokuro NISHIMURA
Electrochemistry Laboratory, Corrosion Research Group
Faculty of Engineering, Hokkaido University

Electrochemical and ellipsometric measurements were made on anodic oxide films formed in the potential regions of incomplete passivity, complete passivity, oxygen evolution, and transpassivity in neutral sodium borate solutions. The cathodic reduction technique, which uses a constant cathodic current and a solution of pH 5.3, enables the anodic oxide film to be dissolved successively from its outermost layer and hence the layer structure of the film to be revealed. It is shown that the passive film is composed of an inner layer of ferric oxide and an outer layer of ferric hydroxide. The film formed in the incomplete passivity region is different from the passive film and contains ferrous ions, probably in the form of ferrous hydroxide, in the outer layer. It is also shown that the optical constants of the inner layer is different from that of the outer layer. The effect of aging on the property of the film is also examined.

2nd International Conference on Phonon Scattering in Solids The University of Nottingham, Nottingham, England 27–30, August, 1975

Computer-Simulated Scattering of Envelope Soliton from Impurity and Interface in One-Dimensional Nonlinear Lattice

T. SAKUMA, T. NAKAYAMA and F. YOSHIDA
Department of Engineering Science, Hokkaido University, Sapporo 060, Japan

In 1970, Tappert and Varma showed that the behavior of heat pulses is governed by the following nonlinear Schrödinger equation under certain conditions on phonon dispersions and lattice anharmonicity,

$$i\phi_t = -\frac{1}{2}\phi_{xx} - |\phi|^2\phi\,, \tag{1}$$

whose solitary wave solution is known as the envelope soliton. Assuming the following form of a progressive wave solution for Eq. (1),

$$\phi(x, t\,;\ a, v) = \psi(x, t\,;\ a, v)\exp\left[ivx - i(v^2 - a^2)\,t/2\right], \tag{2}$$

we can show that the real-valued envelope function ψ satisfies the modified Korteweg-de Vries (KdV) equation.

$$\psi_t + (6v/a^2)\,\psi^2\psi_x + (v/a^2)\,\psi_{xxx} = 0. \tag{3}$$

Eq. (3) has the well-known one soliton solution,

$$\psi(x, t\,;\ a, v) = a\ \mathrm{sech}\left[a(x - vt)\right]. \tag{4}$$

It is, therefore, of importance to investigate numerically the interaction of modified KdV solitons (envelope solitons), Eq. (4), with the impurity and interface in one-dimensional nonlinear lattice in connection with heat pulse experiment.

A survey will be presented of numerical results of the computer simulation concerning the reflection and transmission properties of one envelope soliton from impurity and interface in one-dimensional nonlinear lattice.

2nd International Conference on Phonon Scattering in Solids The University of Nottingham, Nottingham, England 27-30, August, 1975

Surface Phonon Scattering by Density Fluctuation on solid surfaces

Tsuneyoshi NAKAYAMA and Tetsuro SAKUMA
Department of Engineering Science, Hokkaido University, Sapporo 060, Japan

The purpose of the present paper is to investigate theoretically the scattering of surface phonons due to the density fluctuation on solid surfaces. Several theoretical works have been done on the scattering of surface phonons from a point mass-defect on solid surfaces. Such a point mass-defect model is based on the assumption that mass-defects are distributed dilutely on solid surfaces. This assumption is, however, not realistic for actual situations, in which many of the defects distributed are correlated. Therefore, it is reasonable to view surface phonons as propagating along a density fluctuating surface due to all the defects which describe the successive scattering processes.

A quantum theory of elastic surface waves was presented by Ezawa, who constructed a complete orthogonal set of the eigenmodes of elastic waves in a half space with a stress-free boundary plane. Based on this formalism, we present a formula for the damping rate of surface phonons due to the density fluctuation in terms of Green's function. Assuming that the correlation function of the density fluctuation localized near the surface is of the Ganssian type, we obtain the following expression for the damping rate Γ;

$$\Gamma(\omega)\sim\omega^5\exp(-x)\left[f_1^2\left(I_0(x)+I_2(x)\right)+4\gamma^2 f_1 f_2 I_1(x)+2\gamma^4 f_2 I_0^2(x)\right],$$

where

$$x=l_C^2\omega^2/2C_R^2.$$

C_R is the velocity of Rayleigh wave, f_1, f_2 and γ the constants which depend only on Lamè coefficients, and I_n the modified Bessel function of the n-th order. This shows the frequency ω and correlation length l_C dependence of Γ quite different from that of bulk phonons. Depth effects of the density fluctuation for the rate are also discussed.

6th International Congress on Metallic Corrosion, Sydney, Australia, 3–9 December, 1975

Distribution of Phosphate Ions in Anodic Oxide Films Formed on Aluminium in Phosphoric Acid Solution

Masaichi NAGAYAMA and Hideaki TAKAHASHI

Distributions of phosphate ions and protons across the pore-wall were investigated for porous anodic oxide films formed on Al in a 4% H_3PO_4 solution. A technique of dissolving the film in a sulphuric acid solution and analysing phosphate ions in solution was utilized. The dissolution proceeds with the pore-widening evenly throughout its depth without an appreciable decrease in the film-thickness. A tracer method with tritium was used in this technique to measure the proton-distribution. It was found that the outer part of the pore-wall includes both phosphate and protons, the middle part contains only phosphate ions at higher concentrations and the inner part consists of almost pure aluminium oxide. The average concentration of phosphate (4.8–7.2%) was higher for higher anodizing voltages. The mechanism of film-growth during anodizing is discussed, based upon the finding indicating that the concentration profile of the pore-wall is similar to that of the barrier oxide at the pore-base.

This paper was presented at "The 10th Congress of the International Commision for Optics", Prague, Czechoslovakia, August 25–29, 1975

Mutual Coherence Function of Slowly Fluctuating Light Determined by Measurable Beat-Photocurrent Correlation Functions*

Y. OHTSUKA

A proposal is described for measuring the degree of coherence of a light beam which propagates in a slowly fluctuating medium. The second-order mutual coherence function of such a light disturbance is formulated in terms of the two measurable cross-correlation functions produced by light beat-photocurrents. The basic concept is derived from the fact that the light beat-photocurrents which are generated by a fluctuating coherent light-beam reflect the nature of the disturbance in their amplitudes and phases. The resultant formula predicts that the phase as well as the magnitude of the degree of coherence may be measured.

* The oral presentation was made by Professor W. T. Welford of Physics Department, Imperial College of London, England.

International Conference on Radiation Effects and Tritium Technology for Fusion Reactors October 1-3, 1975, Riverside Motor Lodge Gatlinburg, Tennessee, U.S.A.

Irradiation Hardening and Annealing in Irons at a High Neutron Fluence

T. TAKEYAMA, H. TAKAHASHI and N. YOKOYA
Metals Research Institute, Faculty of Engineering, Hokkaido University, Sapporo 060
H. KAYANO
O-arai Branch, The Research Institute for Iron, Steel and Other Metals, Tohoku University, O-arai 311-13

The purpose of the present study is to obtain basic information on the irradiation effect of two kinds of iron with different carbon contents; specimen A (Fe-0.002 wt%C), specimen B (Fe-0.012 wt%C). The behavior of the lattice defects occurring due to neutron irradiation was investigated using electron microscopy and mechanical examination.

Following irradiation, specimen A showed voids of about 500 Å in size. The void density obtained through direct observation was about $1.0\times10^{14}/cm^2$. In contrast, in specimen B the void was difficult to observe. It was concluded that for the formation of voids by irradiation, specimens with less carbon atoms were desirable. An intriguing observation obtained through void formation showed that the yield stress of specimen A was higher than specimen B with a high carbon content. The mechanism involved may be closely related to the hardening caused by void formation.

6th Internationa Congress on Metallic Corrosion, 3rd-9th December, 1975. Sydney, Australia

Anodic Activity of Pure Iron Depending on Strain and Straining Rate

Toshio SHIBATA and Taro TAKEYAMA
Metals Research Institute, Faculty of Engineerieg

A general equation for deciding the anodic activity by continuous elongation was derived by considering the generation of fresh surface and loss of its activity due to film formation. The equation obtained indicates that the anodic activity depends on the film formation parameter and the surface structure parameter which changes with strain and straining rate and also the diffusion parameter depending on the flow con-

dition. High speed straining was applied to a wire of pure iron, the potential of which is kept constant in the passive region in 1 N H_2SO_4 solution. Experimental results indicate that the anodic activity changes with the strain in a similar manner to the stress-strain behavior of this material. The activity increases first, followed by a decrease down to about 5% strain and again increases with the strain. The higher straining rate invariably results in a higher anodic activity. The higher activity at the higher straining rate is explained by the high multiplication of dislocation density and the high diffusion flux which takes place in the laminar flow adjacent to the moving wire surface.

International Conference on Fundamental Aspects of Radiation Damage in Metals Gatlinburg, Tennessee, U.S.A. October 5–10, 1975

Effect of Electron Irradiation on Precipitation of Carbon and Nitrogen in Alpha Iron

T. TAKEYAMA and H. TAKAHASHI
Metals Research Institute, Faculty of Engineering,
Hokkaido University, Sapporo 060 Japan

Vacancies and interstitials were introduced in solution quenched Fe–0.025 wt%C and Fe–0.03 wt%N alloys by aid of electron irradiation in a 650 kV HVEM, and the interaction between the point defects and the solute atoms was studied from the results of aging behavior revealed by the precipitation phenomena. The sequence of precipitation of quench-aging is ε-carbide and cementite for Fe–C alloy and α''-nitride and γ'-nitride for Fe–N alloy. In the irradiated area, however, no visible precipitates appeared on both the aged specimens. As it was certain that mainly a large number of vacancies must remain in the irradiated area, supersaturated carbon or nitrogen atoms are considered to migrate and be trapped by the single vacancies to form C–V pairs or N–V pairs. (C : carbon, N : nitrogen, V : vacancy) Therefore, the precipitation phenomena were prevented by the trapping effect. The dissociation of the C–V pair or N–V pair was observed by the existence of the precipitation in the irradiated area at higher aging temperatures. The detrap temperature of the C–V pair and N–V pair was 240°C and 200°C, respectively. Above these temperatures unusually large particles of cementite and smaller particles of α''-nitride than those seen in the un-irradiated area were observed.

Gordon Research Conference on Fuels Science, June 28-July 2, 1976, New Hampton School, New Hampton, New Hampshire, U.S.A.

Comparison of Various Structural Analyses for Pitch Fractions

Yuzo SANADA
Coal Research Institute, Faculty of Engineering

A comparison of structural parameters calculated by densimetric- NMR-, X-ray diffraction- and computer-methods was made for solvent fractions from pitches. New structural parameters were proposed by a combination of Brown-Ladner's NMR method and Diamond's X-ray diffraction. The results obtained by this combination were in good agreement with those obtained by the computer method. This suggest that both structural analyses are available for the structural analysis of such carbonaceous materials as pitch, and coal extracts. It was found, moreover, that the calculated parameters provide useful information not only for the chemical structure but also for the solubility of pitch. (The article was produced in cooperation with Y. Yamada and T. Furuta, National Research Institute for Pollution and Resources, Kawaguchi, Saitama).